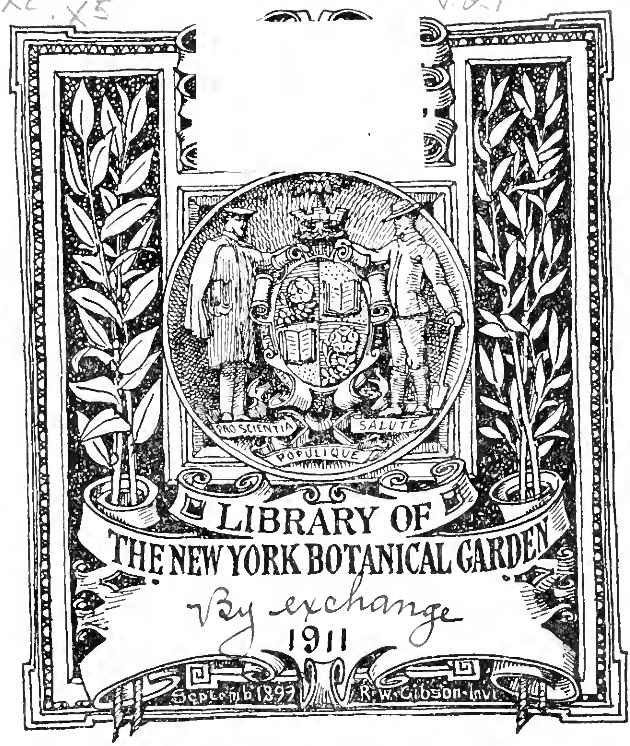

PRO SCIENTIA
SALUTE
POPULIQUE
LIBRARY OF
THE NEW YORK BOTANICAL GARDEN
By exchange
1911
Septemb 1897
R.W. Gibson. Invt

Issued August 25, 1911.

U. S. DEPARTMENT OF AGRICULTURE

OFFICE OF EXPERIMENT STATIONS

A. C. TRUE, DIRECTOR

EXPERIMENT STATION RECORD

Volume XXIV, 1911

WASHINGTON
GOVERNMENT PRINTING OFFICE
1911

U. S. DEPARTMENT OF AGRICULTURE.

Scientific Bureaus.

WEATHER BUREAU—Willis L. Moore, *Chief.*
BUREAU OF ANIMAL INDUSTRY—A. D. Melvin, *Chief.*
BUREAU OF PLANT INDUSTRY—B. T. Galloway, *Chief.*
FOREST SERVICE—H. S. Graves, *Forester.*
BUREAU OF SOILS—Milton Whitney, *Chief.*
BUREAU OF CHEMISTRY—H. W. Wiley, *Chemist.*
BUREAU OF STATISTICS—V. H. Olmsted, *Statistician.*
BUREAU OF ENTOMOLOGY—L. O. Howard, *Entomologist.*
BUREAU OF BIOLOGICAL SURVEY—H. W. Henshaw, *Chief.*
OFFICE OF PUBLIC ROADS—L. W. Page, *Director.*

OFFICE OF EXPERIMENT STATIONS—A. C. True, *Director.*

THE AGRICULTURAL EXPERIMENT STATIONS.

ALABAMA—
College Station: *Auburn;* J. F. Duggar.[a]
Canebrake Station: *Uniontown;* F. D. Stevens.[a]
Tuskegee Station: *Tuskegee Institute;* G. W. Carver.[a]
ALASKA—*Sitka:* C. C. Georgeson.[b]
ARIZONA—*Tucson:* R. H. Forbes.[a]
ARKANSAS—*Fayetteville:* C. F. Adams.[a]
CALIFORNIA—*Berkeley:* E. J. Wickson.[a]
COLORADO—*Fort Collins:* C. P. Gillette.[a]
CONNECTICUT—
State Station: *New Haven;* E. H. Jenkins.[a]
Storrs Station: *Storrs;* L. A. Clinton.[a]
DELAWARE—*Newark:* H. Hayward.[a]
FLORIDA—*Gainesville:* P. H. Rolfs.[a]
GEORGIA—*Experiment:* Martin V. Calvin.[a]
GUAM—*Island of Guam:* J. B. Thompson.[b]
HAWAII—
Federal Station: *Honolulu;* E. V. Wilcox.[b]
Sugar Planters' Station: *Honolulu;* C. F. Eckart.[a]
IDAHO—*Moscow:* W. L. Carlyle.[a]
ILLINOIS—*Urbana:* E. Davenport.[a]
INDIANA—*La Fayette:* A. Goss.[a]
IOWA—*Ames:* C. F. Curtiss.[a]
KANSAS—*Manhattan:* E. H. Webster.[a]
KENTUCKY—*Lexington:* M. A. Scovell.[a]
LOUISIANA—
State Station: *Baton Rouge;*
Sugar Station: *Audubon Park, New Orleans;*
North La. Station: *Calhoun;*
} W. R. Dodson.[a]
MAINE—*Orono:* C. D. Woods.[a]
MARYLAND—*College Park:* H. J. Patterson.[a]
MASSACHUSETTS—*Amherst:* W. P. Brooks.[a]
MICHIGAN—*East Lansing:* R. S. Shaw.[a]
MINNESOTA—*University Farm, St. Paul:* A. F. Woods.[a]
MISSISSIPPI—*Agricultural College:* J. W. Fox.[a]
MISSOURI—
College Station: *Columbia;* F. B. Mumford.[a]
Fruit Station: *Mountain Grove;* Paul Evans.[a]
MONTANA—*Bozeman:* F. B. Linfield.[a]
NEBRASKA—*Lincoln:* E. A. Burnett.[a]
NEVADA—*Reno:* J. E. Stubbs.[a]
NEW HAMPSHIRE—*Durham:* J. C. Kendall.[a]
NEW JERSEY—*New Brunswick:* J. G. Lipman.[c]
NEW MEXICO—*Agricultural College:* Luther Foster.[a]
NEW YORK—
State Station: *Geneva;* W. H. Jordan.[a]
Cornell Station: *Ithaca;* L. H. Bailey.[a]
NORTH CAROLINA—
College Station: *West Raleigh;* C. B. Williams.[a]
State Station: *Raleigh;* B. W. Kilgore.[a]
NORTH DAKOTA—*Agricultural College:* J. H. Worst.[a]
OHIO—*Wooster:* C. E. Thorne.[a]
OKLAHOMA—*Stillwater:* J. A. Wilson.[a]
OREGON—*Corvallis:* J. Withycombe.[a]
PENNSYLVANIA—
State College: T. F. Hunt.[a]
State College: Institute of Animal Nutrition, H. P. Armsby.[a]
PORTO RICO—
Federal Station: *Mayaguez;* D. W. May.[b]
Sugar Planters' Station: *Rio Piedras;* J. T. Crawley.[a]
RHODE ISLAND—*Kingston:* H. J. Wheeler.[a]
SOUTH CAROLINA—*Clemson College:* J. N. Harper.[a]
SOUTH DAKOTA—*Brookings:* J. W. Wilson.[a]
TENNESSEE—*Knoxville:* H. A. Morgan.[a]
TEXAS—*College Station:* H. H. Harrington.[a]
UTAH—*Logan:* E. D. Ball.[a]
VERMONT—*Burlington:* J. L. Hills.[a]
VIRGINIA—
Blacksburg: S. W. Fletcher.[a]
Norfolk: Truck Station, T. C. Johnson.[a]
WASHINGTON—*Pullman:* R. W. Thatcher.[a]
WEST VIRGINIA—*Morgantown:* J. H Stewart.[a]
WISCONSIN—*Madison:* H. L. Russell.[a]
WYOMING—*Laramie:* H. G. Knight.[a]

[a] Director. [b] Special agent in charge. [c] Acting director.

EXPERIMENT STATION RECORD.

CONTENTS OF VOLUME XXIV.

EDITORIAL NOTES.

SPECIAL ARTICLE.

STATION PUBLICATIONS ABSTRACTED.

UNITED STATES DEPARTMENT OF AGRICULTURE PUBLICATIONS ABSTRACTED.

EXPERIMENT STATION RECORD.

Editor: E. W. ALLEN, Ph. D., *Assistant Director.*
Assistant Editor: H. L. Knight.

EDITORIAL DEPARTMENTS.

Agricultural Chemistry and Agrotechny—L. W. Fetzer, Ph. D., M. D.
Meteorology, Soils, and Fertilizers—W. H. Beal. B. W. Tillman.
Agricultural Botany, Bacteriology, Vegetable Pathology—W. H. Evans, Ph. D. W. H. Long.
Field Crops—J. I. Schulte. J. O. Rankin.
Horticulture and Forestry—E. J. Glasson.
Foods and Human Nutrition—C. F. Langworthy, Ph. D.
Zootechny, Dairying, and Dairy Farming—E. W. Morse.
Economic Zoology and Entomology—W. A. Hooker.
Veterinary Medicine—W. A. Hooker. L. W. Fetzer.
Rural Engineering— ——— ———
Rural Economics—J. B. Morman.
Agricultural Education—D. J. Crosby.

CONTENTS OF VOL. XXIV, NO. 1.

SUBJECT LIST OF ABSTRACTS.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

METEOROLOGY—WATER.

SOILS—FERTILIZERS.

AGRICULTURAL BOTANY.

FIELD CROPS.

HORTICULTURE.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

FOODS—HUMAN NUTRITION.

ANIMAL PRODUCTION.

RURAL ECONOMICS.

AGRICULTURAL EDUCATION.

MISCELLANEOUS.

LIST OF EXPERIMENT STATION AND DEPARTMENT PUBLICATIONS REVIEWED.

NOTE.—The price of *Experiment Station Record* is $1 per volume, and two volumes are issued annually. It may be purchased from the Superintendent of Documents, Washington, D. C., to whom all remittances should be made. The publications of the state experiment stations are distributed from the stations and not from the Department.

EXPERIMENT STATION RECORD.

Vol. XXIV. January, 1911. No. 1.

The gathering of experts in various branches of agriculture at Washington in the middle of November was an unusually large and representative one. Rarely have so wide a range of topics relating to education, experimentation, control, and extension in agriculture been considered at any one time. The occasion was in effect an agricultural congress, lacking only a centralizing body to give cohesion and to coordinate the programs of the several societies.

Within the period from November 10 to 18 the annual conventions were held of the Association of American Agricultural Colleges and Experiment Stations, the Association of Farmers' Institute Workers, the Official Agricultural Chemists, the Association of Feed Control Officials, Official Seed Analysts, the American Society of Agronomy, and the Society for the Promotion of Agricultural Science. In addition, the National Association of State Universities was in session and discussed many questions of interest to the agricultural colleges.

The meetings of all these bodies were held separately and to some extent simultaneously, but there was no attempt to spread information as to their meeting place or programs beyond partial mention in some of the announcements of the societies which would meet. The selection of a uniform time and place was purely voluntary and for the convenience of delegates who might wish to attend the meetings of other bodies at that time. That there was not more overlapping of dates and consequent inconvenience to those whose interest extended to several of the societies was due to the work of the secretaries, who frequently experienced considerable difficulty in making the preliminary arrangements.

Although a really large body of men were in session and discussing matters of much import, the sessions were so widely scattered, with no common headquarters and no cooperation between societies, that the impression of a large gathering was absent, and the attention which the meetings attracted as a whole was minimized. In many ways the occasion afforded an excellent illustration of the present disconnected condition with reference to the societies for agricultural science, and the desirability of an affiliation of the societies having a similar purpose. The central officers of such an affiliation could have done a great deal to further the preliminary arrangements for such a gathering, planned an orderly arrangement of dates, and, by extending publicity as to the place and time of meetings and the nature of the programs of the various organizations, prevented confusion and made the various meetings more widely profitable. Something of the overlapping could have been avoided by an arrangement for joint sessions to consider topics of mutual interest to two or more societies.

But the advantage of affiliation need not stop here. Under present conditions there is no provision for a general survey of the various meetings, such as would be of interest not only to the stay-at-homes, but as well to those who were obliged to choose between sessions held in different places at the same time. Except for such a brief account as this journal is able to gather, there is no bringing together in abstract of the proceedings of these meetings, all of which, as a matter of general information at least, are of interest to a large number of people.

Each society or association will provide for the separate publication of its proceedings, in varying form and size, and the distribution of these proceedings will usually be confined to members of the individual societies. In some cases libraries will receive copies only through the generosity of a member. None of these reports will make a volume of sufficient size for binding, but each will go out in pamphlet form, and as such subject to the vicissitudes of such documents. Several societies will probably not publish the results of their meetings in any form, the only record for future information and guidance being the secretary's minutes. which in more than one instance have become lost after a few years and a few rotations in office.

This is an unfortunate situation. It is chaotic and without organization, and is a reflection on the present condition of agricultural science.

The transactions of a scientific society have a permanent value. It is true that, with the other agencies for publication at present afforded, men need not look to the transactions of learned societies as a means of presenting their investigations before the world, as they once did; but the discussions and round tables and conferences have a permanent value as reflecting the point of view, and they have a current interest for a wide circle of people. They furnish the only avenue we now have for criticism and discussion, which, by the way, is a great lack in agricultural science at the present time. The *Record* reviews the published work of the many agencies now engaged in agricultural investigation, but it is not open to contributed articles of comment or discussion, and no journal published under governmental auspices can be. With all the multiplicity of journals this field is still unoccupied. It is one of the real needs of agricultural investigation.

The proposal for an affiliation of the societies for agricultural science has been under consideration for two or three years, the initiative being taken by one of the societies concerned. The attention of various organizations has been called to the matter, and it has been discussed by them to some extent. This year a meeting was held of delegates from 12 societies to consider a plan for affiliation which may be submitted to the various societies as a basis for action.

This plan took the form of a constitution, which was drawn up at the meeting and left in the hands of a secretary to bring to the attention of the different societies at their next meetings. The proposed affiliation does not disturb the autonomy of the various societies in any manner, but in providing for a central organization it paves the way for two important steps, namely, a meeting biennially of the various societies at the same place and time as far as practicable, and the publication of a scientific journal to meet the common needs of the societies. This could serve as a medium for discussion, reports in abstract of the meetings of the societies, notices, reviews, and contributions of general interest in the field of agricultural science.

The interests of the affiliation are placed in the hands of a council composed of members elected from the various societies embraced in the affiliation. This council will facilitate the more orderly and uniform publication of proceedings, and is empowered to make the necessary arrangements for issuing a journal of agricultural science as an organ of the affiliation.

If the work in agricultural science is to attract the attention of scientific men and of the public as it deserves, there must be some agency for drawing together the activities and the results in place of the differentiation and segregation which have been going on of late. These various societies have enough of common interest, in that they focus on agriculture, to serve as a logical basis for an organization to promote their mutual interests. Aside from the advantages which would accrue to the societies themselves, such an organization would promote publicity and give the impression of some degree of unity in the broad movement for the advancement of science in its relations to agriculture.

If without interfering in any way with the existing societies some such plan of affiliation can be effected, an important step will be taken toward unifying and promoting the common objects of the societies of agricultural science and increasing their effectiveness. The desirability of such a step is so evident and the apparent interest in it so widespread as to give much encouragement for its realization.

Through all the meetings of the week the consideration of methods ran as perhaps the most significant single subject. In the present formative stage of agricultural science and education the question of methods—of ways and means—transcends all other questions in importance, for it is fundamental to the acquisition of knowledge which shall stand the test of time, and likewise to its most effective presentation. In control or police work accurate and reliable methods are the basis of justice to the producer and the consumer alike.

The Association of Official Agricultural Chemists and the Official Seed Analysts naturally dealt mainly in their meetings with the consideration of technical methods and questions bearing upon them. The former paused in its deliberations to listen to the annual address of its president on a less specialized subject. In this address Doctor Withers discussed The Teaching of Chemistry in American Agricultural Colleges, reviewing the requirements of colleges in different parts of the country, and showing that while there was considerable variation, the recommendations of the committee on methods of teaching agriculture of the Association of American Agricultural Colleges and Experiment Stations were being quite generally realized in the subject of chemistry. He also made a gratifying showing of the opportunity now afforded at these institutions for training for a chemical career and the quite widespread provision for graduate work in that subject.

The Association of Feed Control Officials continued its discussions upon the subject of a uniform feeding-stuff law for the various States, which was undertaken at the instance of the manufacturers and dealers in such products over a year ago. Definite progress was made, as a tentative law was agreed upon and a list of definitions of by-products used as feeding stuffs was adopted.

Methods for agricultural investigation also constituted a prominent part of the proceedings in the Society for the Promotion of Agricultural Science and the American Society of Agronomy. The trend of the papers and discussions before the latter society was toward standardization of methods for conducting experiments. The present inadequacy of certain methods of procedure in field experiments was emphasized, and the need of improvement was pointed to as fundamental. As illustrating this, numerous experiments were cited which have been made to determine the value for seed of light and heavy kernels of cereals, the results of which are not comparable, owing to the methods pursued, so that despite a large amount of work on the subject the question remains an open one. Furthermore, the results of rotation experiments are so subject to varying seasonal conditions as to make the results difficult to interpret in a reliable way, and liable to lead to wrong conclusions unless the numerous variants are checked.

While many classes of field experiments are apparently quite simple, they are, in fact, difficult and time consuming if the conditions essential to exact results are fully met, and their interpretation calls for careful scientific discrimination and weighing of evidence. These experiments figure so conspicuously in the work of the stations that it is gratifying for this society to take the matter up for critical study through committees. As the organization includes the men who are conducting field and crop experiments, there could hardly be a more pertinent subject for consideration.

Similarly in the extension section and the meeting of Farmers' Institute Workers, the methods of accomplishing the ends sought in carrying the results of scientific work to the man on the land, of demonstrating improved practice, and of interesting the young people in matters relating to agriculture and country life, were subjects around which the papers and discussions turned in large measure.

Closely related to the matter of methods, the standards and requirements of agricultural investigation figured prominently in the meetings of several of the societies. Here such subjects as the training of the investigator came in for considerable attention, and the difficulties at present experienced in securing men competent for independent original investigation were presented. The need of broad and thorough training for such a career can not be too strongly emphasized, and should be made a condition of assignment of men to such work. The time which has elapsed since the passage of the Adams Act has given opportunity for the training of a considerable number of persons, and the holding up of a high standard, with freedom from interference for more elementary work, will induce men from other institutions to enter this field. The scarcity of trained men has led to a false opinion that young men can step speedily out of undergraduate work into important places. The station itself may become a training ground to some extent, and in the event of failure to get men with sufficient preparation may take inexperienced men and train them for the work.

The necessity for a carefully prepared plan of investigation, with a reasonable limitation as to scope, has been forcibly shown through the work of the stations under the Adams Act. The mere accumulation of data, however valuable in itself, is not research, but merely a means to that end, and the absence of a definite aim and a general plan is an evidence of weakness. Too little attention to these matters has been given by station directors in some cases, but there is no more important feature of the station activities than the research work, and the director who is not giving it close attention, both in preparation and in the following of its progress, is administering only a part of the station's activity.

As was to be expected, the various features of extension work came in for much consideration, which was by no means confined to the new section devoted to that subject. This new work has hardly found its place in the organization of the agricultural colleges and experiment stations, and its support is not in all cases adequate to carry out an ideal form of organization. And these facts naturally lead to the consideration of such broad questions as the relation of the new enterprise to the established teaching work of the college and the experimental work of the station, and the reorganization of the institutions to adequately meet the new conditions.

The present conception of the worker in this field shows the advance in thought in regard to this form of effort. The extension worker is now regarded as a teacher in the true sense, and his work as genuinely instructional in purpose, as distinguished from being merely entertaining and aiming to attract large audiences. For him the true spirit and sympathetic attitude are as essential as in the case of the investigator or the class-room teacher; he must combine the scientific regard for established facts and the means of acquiring them with a thorough understanding of the people he is to work for and their needs. The training and preparation of extension teachers were discussed at length, and postgraduate or other courses especially planned to meet the needs of this class of workers were advocated.

The organization of extension work as a separate branch, with a special force of workers and an officer at the head, was considered the most approved plan. This feature has developed so rapidly and reached such proportions that some such plan of organization is now inevitable. Definite provision must be made for it, as the full employment of the regular college and station facilities are required to meet the present demands upon them. The division of the activities of the agricultural college under the three coordinate heads of investigation, collegiate instruction, and extension is now recognized as the logical plan, and organization on that basis has been found advantageous for administrative purposes. Such an organization must, however, recognize and preserve departmental integrity in the institution as based on subject matter.

In 32 States an organization for extension work has been provided, and there are now considerably over 100 persons engaged solely for that branch of work. This shows how rapidly the idea of making special provision for this form of teaching has been propagated. The revenues in twenty-nine States during the fiscal year 1910 aggregated nearly a half million dollars.

But despite the progress, there are still many cases in which the desire to meet the demand for extension teaching has developed far more rapidly than the funds or the personnel for that purpose, with the result that the experiment stations, where the extension work started, have been burdened beyond reasonable limits. Relative to this the committee on station organization and policy sounded a note of warning in its report. It pointed out that "there never was a time when the stations needed to be more circumspect and look more closely to their scientific reputation and even public appreciation than now. * * * To maintain a high and reliable grade of work is a principle incumbent upon all stations, not only for the general cause, but for their own safety as well."

Neither the demonstration work nor the police work, it was urged, must be allowed to encroach upon the acquisition of knowledge, but there must be a clear distinction between propaganda and investigation, between the discovery of principles and the dissemination of their applications to practice. "The station administration must ever keep in mind that the reason for existence and the chief usefulness of the stations depend upon their keeping true to the main purpose for which they were established, the scientific investigation of the problems relating to agriculture." This is a strong position and well taken. It lies at the very foundation of success in the station work. Thoroughgoing investigation, uninterrupted by outside demands, must be allowed to go on to furnish the basis for collegiate teaching and extension work alike.

The movement for a celebration of the semicentennial of the passage of the first Morrill Act received a further impetus and indorsement at the Washington meeting.

At the convention of the Association of American Agricultural Colleges and Experiment Stations in Washington two years ago, attention was called to the fact that the fiftieth anniversary of the passage of the act establishing the land-grant colleges, and likewise of the fundamental law under which the United States Department of Agriculture was organized, will occur in 1912, and that that year will also mark the twenty-fifth anniversay of the passage of the Hatch Act. The association expressed its belief that these anniversaries should be adequately recognized by a great gathering of those interested in all phases of agricultural education, and by the presentation of a program covering the work of agricultural research, of instruction to students in colleges and schools, and of extension teaching in agriculture. It also favored inviting the institutions of agricultural education in foreign countries to participate in such a celebration.

The Secretary of Agriculture has indorsed the cooperative formulation of plans for such a celebration, and designated the Director of this Office to represent him in the matter. The latter, acting in cooperation with a representative from the executive committee, presented a tentative plan for an international congress of agricultural education to be held in Washington in September, 1912. It is proposed to hold the congress in cooperation with the International Commission of Agricultural Education, organized at the second International Congress of Agricultural Education, and the tentative assent of that commission has been secured. The plan places the congress under the patronage of the Government of the United States, through which invitations to participate may be extended to foreign governments and institutions. Sessions occupying five days are contemplated, with excursions to points of interest in Washington and vicinity and to agricultural colleges and experiment stations to occur before and after the congress.

Definite provision is made for the presentation of the history and work of the agricultural colleges and experiment stations in this country and of the United States Department of Agriculture, together with that of similar institutions in other countries. Higher, secondary, elementary, and extension education in agriculture will be included in the scope of the general and sectional meetings. The matter was left by the association in the hands of a committee of five members, to be appointed by the executive committee of the association, and five by the Secretary of Agriculture.

The holding of such a congress, to be made international in character, will call public attention to the remarkable development of a half century in this branch of technical education and in the investigation of the basic industry of the country. Practically the whole movement for the promotion of agriculture by investigation and by teaching is encompassed by this period, and in that time the methods and the basis have been almost entirely worked out. No less important has been the propagation of a public sentiment and confidence to support and sustain such a movement and make possible the present stage of development.

There have been two international congresses of agricultural education, in neither of which has the United States figured very conspicuously. As the theater of perhaps the greatest activity at present, it seems a fitting place for the staging of the third international congress, to celebrate the semicentennial of the birth of scientific agriculture on this continent.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

The determination of humus, F. J. ALWAY, E. K. FILES, and R. M. PINCKNEY (*Nebraska Sta. Bul. 115, pp. 3–25; Jour. Indus. and Engin. Chem., 2 (1910), No. 7, pp. 317–322*).—"The Hilgard, Huston-McBride [E. S. R., 5, p. 510], Cameron-Breazeale [E. S. R., 15, p. 744] and Mooers-Hampton [E. S. R., 19, p. 714] methods for the determination of humus were compared, using arid, semiarid, and humid soils.

"The Hilgard method as used by its author was found to give entire reliable and satisfactory results. In the case of soils rich in humus and those of very fine texture the method is at times very tedious.

"The Huston-McBride or 'official' method gives results which are entirely unreliable and which, in the case of most soils, are far too high. The errors incidental to the method are of such a nature that it seems impossible to apply to the results any satisfactory correction formula. The humus extract obtained by the Huston-McBride method, after being passed through a properly prepared porcelain filter, gives results which are concordant with those obtained by the Hilgard method.

"The Mooers-Hampton modification of the Huston-McBride method gives results entirely concordant with those of the Hilgard method. For some soils it is preferable to the latter, requiring much less time.

"Ammonia solutions of different strengths were not found to have the same solvent power for humus. The differences for strengths between 2 and 8 per cent were slight, but where solutions of from 16 to 28 per cent were used considerably more humus was dissolved.

"The amount of so-called 'humus ash' found in the case of a soil sample varies from method to method and bears no relation to the strength of the ammonia used. There is little or no agreement between duplicate determinations of the 'humus ash.' From 4 to 38 times as much ash is obtained by the Huston-McBride method as is obtained by the other methods. It is probable that the greater portion of the 'humus ash' obtained by any of the methods is not an essential part of the humus. In reporting the humus the percentage of 'humus ash' should always be reported, as it serves as an indication of the reliability of the humus determination."

The determination of phosphoric acid by means of standard silver nitrate, J. M. WILKIE (*Jour. Soc. Chem. Indus., 29 (1910), No. 13, pp. 794–796*).—The method is carried out as follows:

To the phosphoric acid solution phenolphthalein is added and then strong sodium hydrate solution until just a pink color is obtained. This color is then removed with nitric acid added dropwise. When calcium is present no special indicator is required, as the precipitate of calcium phosphate serves the purpose, and the nitric acid is added until solution has taken place. After adding an excess of standardized silver nitrate solution, 10 cc. of a nearly decinormal sodium acetate solution is added, and then a dilute sodium hydrate solution (approximately decinormal), is run in, amid shaking, until the solution is pink to phenolphthalein. A final adjustment is made with decinormal sodium hydrate or sulphuric acid. To the solution thus prepared is added 2 cc. of a decinormal sulphuric solution, then made up to 150 cc., mixed thoroughly, filtered, and the residual silver in 100 cc. of the filtrate determined according to the Volhard method. The results obtained in the presence or absence of nitrates, calcium salts, sulphuric acid, etc., were excellent. Chlorids, if present, must be allowed for.

The volumetric estimation of potash in organic liquids, W. A. DRUSHEL (*Ztschr. Anorgan. Chem., 61 (1909), No. 1, pp. 137–146; abs. in Bul. Soc. Chim. France, 4. ser., 8 (1910), No. 4, p. 278*).—The oxidizing material was a mixture consisting of 9 parts of nitric acid and 1 part of sulphuric acid. When protein is present nitric acid or bromin is used for the oxidation. In the latter instance, however, the acid is driven off and the residue taken up with hydrochloric acid and then heated again. For estimating potash the residue is taken up with a few drops of acetic acid in a little water. To this is added an excess of sodium cobalti-nitrite solution, and the whole evaporated to dryness. On cooling a little cold water is added, filtered through an asbestos filter, and the precipitate washed with a half-saturated solution of sodium chlorid. The precipitate is then oxidized with potassium permanganate and the excess of permanganate determined with decinormal oxalic acid solution.

Notes on the analysis of edestin and zein, T. B. OSBORNE and L. M. LIDDLE (*Amer. Jour. Physiol., 26 (1910), No. 4, pp. 295–304*).—The latest results obtained in the analysis of edestin and zein indicate that considerable losses of amino acids, especially alanin, must have occurred in former analyses of these proteids. The authors also show that very satisfactory esterifications can be obtained with Phelps and Phelps' method [a] (used in the malonic acid work by Phelps and Tillotson [b]) with proteins which yield small or large amounts of basic amino acids. Contrary to Abderhalden's findings, they were not able to isolate any oxyprolin from the decomposition products of edestin.

The hydrolytic products of zein reported, which are believed to represent the actual proportions more accurately than any separate analyses, are as follows: Glycocoll, none; alanin, 9.79; valin, 1.88; leucin, 19.55; prolin, 9.04; phenylalanin, 6.55; aspartic acid, 1.71; glutaminic acid, 26.17; serin, 1.02; tyrosin, 3.55; arginin, 1.55; histidin, 0.82; lysin, none; tryptophan, none; ammonia, 3.64; and carbohydrate, none; making a total of 85.27 per cent.

A consideration of the sources of loss in analyzing the products of protein hydrolysis, T. B. OSBORNE and D. B. JONES (*Amer. Jour. Physiol., 26 (1910), No. 4, pp. 305–328*).—The authors claim that many of the causes of loss in analyzing the products of a protein hydrolysis are due to the present methods of analysis. With this in mind, they have analyzed zein with a view to obtaining the highest possible results and to gain a knowledge of those products of hydrolysis which can not be separated into definite substances, and, further, for purposes of comparison have analyzed by the same method a mixture of pure amino acids in the same proportion as found in the protein analyzed.

About the individuality of cellase and emulsin, G. BERTRAND and A. COMPTON (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 5, pp. 402–404*).—The results show that cellase and emulsin are present together, but in variable proportions. This indicates that they are individual enzyms (see E. S. R., 23, p. 306).

---

[a] Amer. Jour. Sci., 4. ser., 24 (1907), p. 194.
[b] Amer. Jour. Sci., 4. ser., 26 (1908), p. 243.

Determination of starch in cereals by means of the Zeiss immersion refractometer, L. M. LALIN (*Ztschr. Gesam. Brauw.*, *32 (1909), pp. 231–233; abs. in Jour. Soc. Chem. Indus.*, *28 (1909), No. 11, pp. 617, 618*).—The Zeiss immersion refractometer was employed to determine the refraction during the various stages of the hydrolysis of starch. It was apparent that the coefficient of refraction did not change with the enzymic action until a point was arrived at in which iodin produced no reaction. Different starches were tested in this relation, as well as Lintner's soluble starch. The diastase employed in these tests was obtained by precipitating cold infusions obtained from a well-grown malt rich in protein with ammonium sulphate. The concentration of the starch solution varied between 1 and 5 per cent, and each gram of starch employed was found to be equivalent to 4 degrees on the scale of the refractometer.

The method is as follows: Two or 3 gm. of material finely ground are triturated heavily in a mortar with a little water and transferred to a 100 cc. flask, which is then filled up to about 80 cc. To this is added 0.2 cc. of a 1 per cent solution of the diastase, and the mixture heated for 5 minutes in the boiling water bath and finally cooled to room temperature. A further addition of 0.2 or 0.3 cc. of diastase solution is made, the flask kept at 55 to 60° C. for ½ hour, then cooled and made up to the 100 cc. mark at 17.5°. A correction is then made for the refraction of the soluble constituents of the cereal. This is obtained by pulverizing 2 or 3 gm. in the mortar with small amounts of water, introducing the mass into a 100 cc. flask, filling to the 100 cc. graduation with water, filtering after agitating well, and establishing the refraction at 17.5°, The results obtained with the method compare closely with the figures obtained by the Lintner polarimetric method.

Detection of cruciferous oils in oil mixtures, D. HOLDE and J. MARCUSSON (*Ztschr. Angew. Chem.*, *23 (1910), No. 27, pp. 1260–1262*).—The chief representative of the oils of this order is rape oil. The reaction utilized by the authors is based on the precipitation of erucic acid and determining its molecular weight, as follows:

From 20 to 25 gm. of the oil to be examined is dissolved in a double volume of 96 per cent alcohol in a wide-mouth test tube, and cooled to —20° C. with the aid of an ice-and-salt mixture, stirring the oil during the cooling process. The precipitate of fatty acids is collected on a cold funnel (such as is employed in determining the paraffin content of oils according to the alcohol-ether method), rendered dry with the suction pump, and washed with cold alcohol two or three times. The filtrate is concentrated, and the residue taken up with four times its volume of alcohol (75 volume per cent) and cooled to —20°. If cruciferous oils are present, a precipitate forms upon stirring and after about 1 hour, which, upon washing with 75 per cent alcohol, appears white and consists mostly of erucic acid. This is dissolved in benzol or ether on the filter, the filtrate concentrated, and the molecular weight of the residue determined by the titration method. The molecular weight, if rape oil or other cruciferous oil is the substance employed, lies between 310 and 320, while that of pure erucic acid is 338.

The detection of rape oil in olive oil and other edible oils, M. TORTELLI and V. FORTINI (*Chem. Ztg.*, *34 (1910), No. 78, pp. 689, 690*).—The method is based on the detection in the suspected sample of the erucic acid contained in rape oil by three successive determinations, as follows: (1) The iodin number of the fatty acids, which yield insoluble or only slightly soluble lead soaps; (2) the melting point of the lead soaps; and (3) the critical solution temperature of the sodium salt which is obtained by the decomposition of the lead soaps. See also the abstract noted above.

The sulphur compounds of the onion (Allium cepa), W. D. KOOPER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 10, pp. 569–571; abs. in Chem. Abs., 4 (1910), No. 17, pp. 2337, 2338*).—Considerable quantities of thiocyanic acid were found in the weakly acid juice of freshly expressed onions. The allyl ester of the acid was also present, but no allyl aldehyde. The author gives a brief review of the existing literature on the subject, and reports his analyses of onions. He found 0.047 per cent of mustard oil and 0.015 per cent of sulphur in organic combination.

The erepsin of the cabbage (Brassica oleracea), ALICE F. BLOOD (*Jour. Biol. Chem., 8 (1910), No. 3, pp. 215–225*).—"An active solution of a vegetable erepsin can be prepared from the white cabbage by the ammonium sulphate method. This solution deteriorates only slowly if kept in a cool place under toluene. Cabbage erepsin splits tryptophan from Witte's peptone and casein, and tyrosin from peptone 'Roche.' It clots milk and liquefies gelatin. It does not digest fibrin, coagulated egg white, or edestin in neutral, acid, or alkaline solution, or in the presence of HCN. It does not liberate any tryptophan from the protein precipitated with it from the cabbage by ammonium sulphate. The erepsin is active over a considerable range of acidity and alkalinity, but is inhibited by a concentration of hydrogen ions corresponding to acidity to methyl orange. No evidence was obtained that hydrolysis is favored by high temperatures or that it is greatly accelerated by HCN."

The presence of some organic bases in Boletus edulis, K. YOSHIMURA (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 3, pp. 153–155*).—From the analysis of 1 kg. of air-dry fungus there was obtained adenin 0.12 gm., histidin 0.14 gm., and trimethylamin 0.15 gm. Arginin and cholin were not found.

The composition of malt vinegar, E. RUSSELL and T. R. HODGSON (*Analyst, 35 (1910), No. 413, pp. 346–348*).—Analyses of 13 samples of vinegar, 9 of which were genuine, 2 wood vinegar, 1 prepared without malt, and 1 of doubtful origin but sold as malt vinegar, are reported. From these analyses it appears that pure malt vinegar varies but little as to the total solids (from 1.47 to 3.15 per cent), these being higher than those contained in wood vinegar. The actual acetic acid present varied from 3.85 to 6.36 per cent. The ash content was from 0.18 to 0.6 (higher than in wood vinegar), the phosphates from 0.047 to 0.092 per cent. Phosphates were absent in wood vinegar. The vinegars made without malt showed very little difference in constituents from those made from malt, except possibly in the phosphorus content, and could easily have passed the United States standard as genuine. The alkalinity of the ash was found to be of no value in differentiating between wood and malt vinegars.

An accurate method for estimating the caffein in tea and in green and roasted coffee, J. BURMANN (*Bul. Soc. Chim. France, 4. ser., 7 (1910), No. 6, pp. 239–244, fig. 1; abs. in Chem. Ztg., 34 (1910), No. 92, Repert., p. 380, fig. 1*).—To 5 gm. of the air-dry, fat-free substance 150 cc. of chloroform and 5 gm. of a 10 per cent solution of ammonium hydrate are added. The solution is filtered and the filtrate concentrated in an Erlenmeyer flask, dried, and weighed. The residue, which has a dark brown color, is then dissolved in a little chloroform, brought into a glass tube which has two constrictions (illustrated in the original article), the chloroform evaporated on the water bath, and the residue finally dried in vacuum at 100° C. In the lower constriction of the tube is placed an asbestos plug, and in the upper one a cotton plug. The whole apparatus is then put into a paraffin bath and heated at from 210 to 240°. After 3 hours, when the caffein has sublimed, the portion of the tube below the lower constriction is cut and the caffein therein taken up with chloroform, dried, and weighed as usual. The weight multiplied by 20, plus 2.5, gives the percentage of pure caffein in the sample.

Chemistry and physiology of milk, W. Grimmer (*Chemie und Physiologie der Milch. Berlin, 1910, pp. XII+364, figs. 37*).—This excellent work contains the following chapters: Structure and function of the mammary glands; the composition and general characteristics of the milk of various animals; the physical characteristics of milk; the proteins of milk; the fat of milk; the carbohydrates of milk; the salts of milk; other milk constituents—phosphatid, cholesterin, etc.; the enzyms of milk; the bacteria of milk and their antagonists; the immune bodies, lactoserum; the passage of foreign bodies over into the milk; sterilization, pasteurization, infants' milk; milk preparations; milk as a nutrient; and the examination of milk, which includes the physical, chemical, and biological methods.

The physical chemistry of the calcium chlorid serum of milk, G. Wiegner (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 2, pp. 70–86*).—In a former communication (E. S. R., 22, p. 514) it was shown that a definite relation exists between the refraction and the specific gravity of the calcium chlorid milk serum, and that within certain wide but definite limits this relation is entirely independent of the composition of the calcium chlorid serum.

The present article deals chiefly with showing the accuracy of the above conclusions, with particular reference to the results calculated according to the author's formula and the values actually observed. The results indicate that the specific refraction of the calcium chlorid milk serum is an "additive property," which can be considered the sum total of the specific refractions of the individual constituents, and that this specific refraction is within certain wide limits independent of the individual constituents.

The specific volume of the calcium chlorid milk serum is also an "additive property" and can be considered as the sum of the specific volume of the constituents of the calcium chlorid milk serum. In this calculation, however, the contraction taking place on solution of the constituents must be considered. As the specific volume has the reciprocal value of the specific gravity, it is thereby possible to estimate the specific gravity of the calcium chlorid milk serum from its composition, in every instance. With the aid of the specific gravity of the dry substance of the calcium chlorid milk serum, which in all probability is constant (1.685 at 20° C. when prepared with water at 4°), the dry substance in the calcium chlorid milk serum can be determined.

Preformed sulphuric acid in milk, J. Tillmans and W. Sutthoff (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 2, pp. 49–63*).—The results show that preformed sulphuric acid is present in woman's, cow's, goat's, and mare's milk in the form of ordinary sulphate-sulphuric acid. The sulphur of milk is on the average distributed in parts per 100 of sulphur as follows:

Distribution of the sulphur in the milk of various animals.

Source of milk.	Protein sulphur.	Organic nonprotein sulphur.	Sulphur in the form of preformed sulphuric acid.
	Per cent.	*Per cent.*	*Per cent.*
Cow	84.7	4.9	10.4
Goat	87.9	6.3	5.8
Mare	90.2	5.8	4.0

Investigations in regard to milk ferments and their origin, J. Wohlgemuth and M. Strich (*Sitzber. K. Preuss. Akad. Wiss., 1910, XXIV, pp. 520–524; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 9–10, pp. 478, 479; Chem. Zentbl., 1910, II, No. 5, p. 331*).—The authors found a peptolytic ferment in the milk from women and from various animals. For detecting the ferment the peptid glycyltryptophan and the bromin reaction was chosen. The ferment was thermolabile, but very resistant toward gastric juice. Further investigations were made for the purpose of eliciting the origin of milk ferments, and it appears that animals which have a high diastatic power in the blood have a low one in their milk. Cow's and goat's milk does not contain this diastase, but human milk contains much more diastase than human blood.

The authors conclude that the diastase of milk does not originate from the blood and is to the greatest extent a product of the activity of the mammary gland. On the other hand, however, they were able to show that it was possible for ferments of the blood to migrate into the milk. Tying the duct of Wirsung increased the diastase content of both the blood and milk.

The estimation of diastase in milk, J. Van Haarst (*Chem. Weekbl., 7 (1910), No. 16, pp. 354, 355; abs. in Chem. Zentbl., 1910, I, No. 21, p. 1852*).—A description is given of Koning's method, which consists in placing 10 cc. of milk in each of 15 test tubes and adding to the first tube 1 drop of a 1 per cent solution of starch, to the second tube 2 drops, and to the third, 3 drops, etc. The tubes are allowed to stand for 30 minutes, when 1 cc. of iodin solution is added to each tube and the color noted.

The author tested this method, using water instead of milk, and found that water also exerts a diastatic action. From this he concludes that the method is inaccurate.

Diastase estimation in milk, C. J. Koning (*Chem. Weekbl., 7 (1910), No. 17, p. 377; abs. in Chem. Zentbl., 1910, I, No. 21, p. 1852*).—A reply to the above, in which the author states that he had pointed out the hydrolytic action of water on starch long ago. This factor, however, does not lessen the value of the diastase test.

The relation between fat and calcium in cream, H. C. Lythgoe and C. E. Marsh (*Jour. Indus. and Engin. Chem., 2 (1910), No. 7, pp. 327, 328*).—The results indicate that the calcium content in pure cream varies greatly, being lowest in heavy and highest in light cream. Tests of remixing with cream the skim milk from which it was separated showed that this increased the calcium content in the final product. In testing commercial samples of cream it was found that most of the samples were relatively lower in calcium than those of known purity or those separated in the laboratory. This was probably due to the fact that commercial creams are usually pasteurized.

About moisture and fat estimation in cheese, M. Siegfeld (*Milchw. Zentbl., 6 (1910), No. 8, pp. 352–361*).—A study of methods for moisture and fat, including for fat the hydrochloric acid, the Gottlieb, and the acid butyrometric methods. The last named yields results almost equivalent to the gravimetric method and is recommended for practical purposes.

Potato culls as a source of industrial alcohol, A. O. Wente and L. M. Tolman (*U. S. Dept. Agr., Farmers' Bul. 410, pp. 5–34, figs. 10*).—This publication shows that when potato culls in a potato-growing region are economically handled and converted into tax-free alcohol with the aid of proper machinery, a good outlet for an otherwise unmarketable product is obtained. This is particularly true where the manufacture of the alcohol is conducted on a cooperative basis.

The following topics are discussed in a form devoid of technical terms: Fundamental considerations in establishing a potato distillery, location, machinery and equipment, and control of operation; estimated costs of a potato distillery plant, cost of operation, and value of output; government regulations; details of operating a potato distillery, including the preparation and fermenting of the mash, determining of the specific gravity and acidity of the fermented mash, distilling and denaturing the alcohol, and the yield of alcohol; malt, its diastatic power, preparation of green barley malt, steeping the grain, sprouting the grain, crushing the green malt, value of green malt from various grains, and relative value of green and dried malt; yeast, including its development, spontaneous and pure-culture yeasts, development of a start yeast, preparation of a spontaneous hop yeast, yeast mashes, and preparation of grain and potato yeast mashes; analytical data, with reference to the composition of the whole potatoes, their purchase on the basis of starch content, a simple method of determining starch, analysis of potato skins, and the composition of the potato slop. Data pertaining to the slop feeding of animals are abstracted on page 71 of this issue.

Sulphate scale in evaporators, S. S. Peck (*Hawaiian Sugar Planters' Sta., Div. Agr. and Chem. Bul. 33, pp. 30, charts 2*).—This is a continuation of the work previously reported (E. S. R., 19, p. 981), and from which it is concluded that "the use of sodium carbonate in addition to lime in clarifying juices decreases the amount of insoluble ash in the filtered juice; decreases the amount of phosphoric acid in the same; decreases the amount of lime in the same; increases the amount of mineral matter removed by filtration, or the equivalent of the work of the filter presses in factory operations; in juices of high sulphuric acid content, not enough lime will be left to form a serious lime sulphate scale; effects a partial removal of magnesia from the juice; effects a slight increase in organic impurities removed from the juice; improves the working of after products by removal of calcic salts; on account of the cost of the material, the expense of clarification will be materially increased."

Text-book of starch manufacture, E. Parow (*Lehrbuch der Stärkefabrikation. Berlin, 1908, vol. 1, pp. XXII+310, figs. 73*).—This work confines itself chiefly to potato-starch manufacture and the examination of the resulting products. Its chapters are as follows: Potato-starch manufacture, the apparatus and reagents employed for the technical control of the industry, the methods for examining the raw material, the resulting products and other substances, and the characteristics of the starches. The method of examining cereal starches is also considered.

Subject and author index to Hoppe-Seyler's Zeitschrift für Physiologische Chemie, K. Thomas (*Hoppe-Seyler's Zeitschrift für Physiologische Chemie. Sachund Autorenregister zu Band XXXI–LX. Strassburg, 1910, pp. 469*).—This is a combined subject and author index from volume 31 to volume 60, inclusive.

METEOROLOGY—WATER.

The principles of meteorology, A. V. Klossovskiĭ (*Osnovy Meteorologii. Odessa, 1910, pp. 525, figs. 199; rev. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 1, pp. 151–153*).—This text-book consists of three parts, (1) satistical meteorology, (2) dynamical meterology and meteorological optics, and (3) the earth's magnetism, electrometeorology, and methods of present meteorology.

Weather, water, and air, M. Hoffmann (*Jahresber. Landw., 24 (1909), pp. 1–7*).—Recent investigations on this subject are classified and reviewed.

The relation of the weather to cultural and fertilizer experiments, and plant culture in general, Grohmann (*Mitt. Deut. Landw. Gesell., 25 (1910), No. 28, pp. 427–433*).—The number of hours of sunshine and the total annual rainfall at Chemnitz for a period of 10 years, beginning with 1895, are recorded and the influence of these factors on winter wheat, winter rye, oats, barley, and potatoes is studied. Sunshine and precipitation are taken as the determining climatic factors. As a basis for his calculations the author uses a so-called weather unit, consisting of 20 hours sunshine and 10 mm. precipitation, although within certain limits an excess of one of these factors is allowed to compensate for a deficiency of the other. He divides the growth of the plant into 2 periods, the first extending from the time of planting to the formation of the ears (in case of potatoes to the time of blossoming), and the second extending from the end of the first to the time of ripening.

The average number of these weather units and the annual yield of each crop for 10 years (1895–1904) were as follows: Winter wheat, 43 units, 1,781.7 lbs. per acre; winter rye, 39 units, 1,434 lbs. per acre; oats, 33 units, 1,496.36 lbs. per acre; barley, 30 units, 1,469.64 lbs. per acre; and potatoes, 37 units, 9,548.18 lbs. per acre.

Similar data are recorded for oats, rye, and turnips, grown at the experiment station at Dresden during 1908–9.

Report of the consulting meteorologist, J. F. VOORHEES (*Tennessee Sta. Rpt. 1909, pp. 108–112, charts 2*).—This report reviews briefly some of the more significant data given in Bulletin 87 of the station (E. S. R., 23, p. 14), calling attention particularly to the typical rainfall distribution in Tennessee and the relation between July rainfall and the corn crop.

It is shown that while conditions are otherwise very favorable to this crop, it is often reduced by dry weather in July. It is pointed out that this unfavorable condition may be overcome to a considerable extent by tillage and the use of green and stable manures to conserve the moisture.

Bulletin of the Mount Weather Observatory (*U. S. Dept. Agr., Bul. Mount Weather Observ., 3 (1910), pt. 2, pp. 69–126, pls. 2, fig. 1*).—This number contains the concluding part of an article on Solar Radiation, Atmospheric Absorption, and Sky Polarization, at Washington, D. C., by H. H. Kimball, and includes a very complete classified bibliography of the subject.

Studies on the phenomena of the evaporation of water over lakes and reservoirs, VII, F. H. BIGELOW (*Mo. Weather Rev., 38 (1910), No. 7, pp. 1133–1135*).—Summarizing the results of the investigations mainly on Salton Sea thus far reported (E. S. R., 21, p. 115; 23, p. 15) the author states that "it is evident that the research of the Salton Sea campaign, while settling a number of important points in evaporation, has raised a series of difficult questions. The theoretical side of the problem, the application to the thermodynamic theories, has not been attempted, as this would require an exclusive study under laboratory conditions and processes. Practically it seems necessary for engineers to adopt a standard pan and reduce the observed readings to the open water surface. Thus the evaporation from a 4 ft. standard pan, when corrected for temperature and wind and multiplied by the factor 66 per cent is about what observation suggests. If a water thermometer on a small raft in the lake measures S_o, and a sling psychrometer measures e_a through t and t_1, and an anemometer placed as near the water as possible is used for the wind velocity, then the coefficient is $C=0.138$ for 24-hour intervals. For the formula, use the mean values of S_o, e_s, e_a, w, taken at readings made about 6 a. m. and 2 p. m., the times of minimum and maximum meteorological conditions. If any reservoir, where the inflow is measured accurately and the rainfall can be fully accounted for, can be observed for some time it may be possible to check further the accuracy of this formula. Since local conditions count so much on the action of an evaporation pan it would not be possible to improve this formula by any small number of observations. The formula can easily be extended to working tables whenever it is felt that the adopted coefficients of this report are reliable."

Influence of soil mulches in checking evaporation, D. H. Bark (*Mo. Weather Rev., 38 (1910), No. 7, pp. 1098, 1099, figs. 2*).—This is a brief article based upon experiments reported in detail in a bulletin of this Office (E. S. R., 18, p. 1087).

The fight against hail (*Abs. in Rev. Sci. [Paris], 48 (1910), II, No. 14, p. 435*).—This is a brief discussion of the possibility and practicability of the explosive method of hail protection.

Frosts in Wisconsin: Occurrence, prediction, and methods of prevention, J. L. Bartlett (*Bul. Univ. Wis. No. 290, pp. 43, figs. 9*).—This bulletin explains the principles of frost formation, atmospheric and local conditions affecting the occurrence of frost, the occurrence of killing frosts in Wisconsin, the prediction of and damage caused by frosts, methods of artificial protection, and practicability of frost protection in Wisconsin. A short bibliography of the subject is given.

Report of the Chief of the Weather Bureau, 1908–9 (*U. S. Dept. Agr., Weather Bur. Rpt. 1908–9, pp. 268, figs. 2*).—Part 1 of this document consists of an administrative report reviewing the operations of the Weather Bureau during the year; part 2 gives a list of observing stations and changes therein during 1908, monthly records of sunshine at 137 stations, and records of excessive rainfall during 1908; part 3, monthly and annual meteorological summaries for 186 stations; part 4, monthly and annual means and annual extremes of temperature and dates of first and last killing frosts, 1908; and part 5, monthly and annual precipitation, 1908, and monthly and seasonal snowfall, 1908–9.

The report records progress in the reconstruction of the administration building destroyed by fire October 23, 1907, in aerial and magnetic observations, and observations on solar radiation, and in studies on evaporation and on snowfall in mountains, and notes the establishment of new meteorological stations at Eagle, Tanana, and Valdez in Alaska, the successful prediction of the Key West hurricane of October 11, 1909, and the adoption of a new form of publication of the Monthly Weather Review (E. S. R., 22, p. 419).

Monthly Weather Review (*Mo. Weather Rev., 38 (1910), No. 7, pp. 991–1146, figs. 3, charts 33*).—This number contains the usual climatological summaries, weather forecasts and warnings for July, 1910, river and flood observations, lists of additions to the Weather Bureau library and of recent papers on meteorology and seismology, a condensed climatological summary, and climatological tables and charts. There are also special papers on Influence of Soil Mulches in Checking Evaporation (illus.), by D. H. Bark (see above); Frost Fighting, by A. B. Wollaber (see p. 38); The Disposition of Smoke, by A. G. McAdie; Report on the Annual Rise in the Columbia River, 1910 (illus.), by T. F. Drake; Frost Fighting in the Boise Valley, by E. L. Wells; and Studies on the Phenomena of the Evaporation of Water Over Lakes and Reservoirs, VII, by F. H. Bigelow (see p. 16).

Meteorological notes and data, A. F. Mantle and G. A. Charlton (*Ann. Rpt. Dept. Agr. Prov. Saskatchewan, 5 (1909), pp. 99–111, 197–200*).—Notes are given on the weather of Saskatchewan during each month of 1909 as compared with the conditions in 1907 and 1908. Tables show the geographical position and elevation of the meteorological stations in the Province, the minimum, maximum, and mean temperature at these stations during each month of 1909, and the average monthly and annual precipitation for the Province during 1907 to 1909 as compared with the average for 10 years. There is also a table which shows the maximum and minimum daily temperatures at Regina during each month of 1909.

Climatology of Venezuela (*An. Estad. Venezuela, 1908, pp. 1–7, dgm. 1*).—Tables and a diagram are given which show the geographical position, altitude, and mean annual temperature of the principal cities and towns of Venezuela; also the temperature, barometric pressure, and rainfall at Caracas during the years 1904 to 1908.

Ground-water supply and irrigation in the Rillito Valley, G. E. P. Smith (*Arizona Sta. Bul. 64, pp. 81–244, pls. 5, figs. 58*).—This is a report on an investigation undertaken to determine the possibility and practicability of reclaiming small areas of land by the development and utilization of ground waters in the arid valleys of southern Arizona.

The studies here reported dealt with the origin, amount and value, character, rate and magnitude of motion, and technical and economic questions relating to the recovery of ground water in the Rillito Valley and the nearby portions of the Santa Cruz Valley, which are considered typical arid valleys of southern Arizona.

"That small area projects can be successfully developed in the valleys of southern Arizona by utilizing the ground water is the conclusion expressed in this bulletin. Large irrigation projects commensurate with those of the United States Reclamation Service in the Salt River Valley and on the Lower Colorado are not to be found south of the Gila River. But numerous small areas, from a few score of acres to ten thousand acres in extent, may be reclaimed. There are ground-water supplies sufficient in amount; the economic considerations of recovering these waters are not prohibitive."

The bulletin describes the topography, geology, soils, and agricultural possibilities of the Rillito Valley, the extent to which irrigation, particularly winter irrigation, is already practiced, rainfall and surface water, underflow tests, logs of test wells and other representative wells in the region, the water table, ground-water supply, individual pumping plants, and a cooperative pumping project.

The rainfall of the Rillito watershed ranges from an average of 12 in. in the valley to over 35 in. on the tops of the adjacent mountains, but practically all of it is quickly lost by evaporation and it never affects the underlying water table directly. There is little run-off from the valley into stream channels.

"Of the greater rainfall on the mountains, a considerable percentage is discharged from the mountain canyons. Records show greater average discharge in winter than in summer. After issuing from the rocky canyons onto the valley fill, the stream flows rapidly diminish, being absorbed into the porous gravel deposits, which are in some places of shallow depth and in other places broad and deep, affording extensive storage capacity. The entire flow is usually absorbed within a comparatively few miles. . . .

"Studies of the water table prove that the ground waters of the Rillito Valley are derived exclusively by seepage from the stream flows. . . .

"The application of the electric method to the recent sands and gravels of the Rillito near Fort Lowell has revealed the existence there of much higher underflow velocities than any others on record.

"At the principal section tested . . . the high rate of movement is restricted to the vicinity of the river and to shallow depths, so that despite the high velocities, the quantity of underflow is not great." It is pointed out, however, that small underflow ditches can be developed in this and similar situations if conditions are favorable.

"Bed rock, a dyke, a lava flow, consolidated gravels, a clay deposit, or other 'accident of nature' may furnish the favorable condition. Bends in the stream course which cause it to descend along a ground-water contour produce favorable locations for developing the underflow by gravity ditches.

"The section of the Rillito Valley, as exposed by five deep test wells, together with numerous shallow wells, consists of a porous gravelly recent fill underlain by an older, nearly impervious main valley fill.

"The water-bearing gravel of the recent fill is clean, coarse, well-sorted, and porous, and affords extensive ground-water storage. . . .

"The main fill is compacted, and nearly impervious and sustains the ground water at shallow depths. In arid valleys where the main fill is pervious, the underdrainage may exceed the inflow and consequently no ground water may exist except at great depths. . . .

"The fluctuations of the water table are extreme beneath the Rillito bottomland, becoming less with distance away from the river. Waves of flow starting from the river during flood seasons have been traced underground away from the river toward the south. . . .

"The porous character of the Rillito fill, the high rate of underflow observed, well sections, pumping tests, and seepage measurements unite to demonstrate a large ground-water supply, of which, however, existing data do not permit exact computation. . . .

"The development of Rillito ground waters must be mainly by pumping. Individual pumping plants as now existing and in use, are poorly designed, unintelligently operated, and furnish water only at very high cost per acre-foot."

Cooperative ownership and operation of large plants is considered the most economical and efficient means of pumping the water for irrigation. A plan for such a cooperative enterprise is described in detail.

Water-logging of the Nile Valley, H. G. J. de Lotbinière (*Cairo Sci. Jour., 4 (1910), No. 48, pp. 221–223, pl. 1*).—It is pointed out in this article that as a result of the uneven character of the alluvium of the Nile Valley and of over-irrigation and seepage from high level canals water-logged areas are of frequent occurrence in the soils. To find a remedy for such conditions it will be necessary to devise a method of drainage based upon a careful study of the character of the soil.

The water, O. Anselmino (*Das Wasser. Leipsic, 1910, pp. VI+122, figs. 44*).—This booklet treats briefly and simply of the chemistry of water, the water of the earth, purification of water, drinking water, mineral waters, and diffusion.

SOILS—FERTILIZERS.

The soils and soil-formers of the subantarctic islands, B. C. Aston (*Reprint from Subantarctic Islands of New Zealand. Wellington, N. Z., 1909, pp. 745–777, pls. 12*).—This report on soil investigations in the subantarctic islands of New Zealand is divided into descriptions and analyses of the humus of the Auckland, Campbell, and Antipodes islands; analyses of rocks and minerals from Campbell, Enderby, and Auckland islands, and of the products of their weathering; analyses of granite from Snares and Bounty islands; and analyses of sea-lions' and sea-birds' dung from Snares and Bounty islands, respectively.

A purpose of these investigations was to indicate why the soils of these islands are so abundantly supplied with humus. It was found that the soils "are for the greater part not formed in the manner in which peat in its special sense is formed, inasmuch as (*a*) they are derived chiefly from the decay of the higher plants (Filices, Juncaceæ, Gramineæ, Araliaceæ, Umbelliferæ, Compositæ, Liliaceæ, Rubiaceæ, Myrsineæ, and Epacridaceæ) on the uplands and unforested areas, and from Filices, Myrtaceæ, Epacridaceæ, Araliaceæ, and Compositæ in the forests; (*b*) they are not formed in or under stagnant water, [and] many of the soils must have been formed on a steep hillside, with every advantage of drainage which such a position could afford . . . ; (*c*) they support a vigorous growth of higher plants, generally understood to require a soil rich in mineral nutrients."

The soils are different from European moor soils in containing a much higher percentage of nitrogen at all depths, being richest in the top layer, and in having a higher percentage of ash in the upland soils than in the low bogs.

The method used in analyzing the soils is described.

The effect of moisture and of solutions upon the electric conductivity of soils, R. O. E. DAVIS (*Trans. Amer. Electrochem. Soc., 17 (1910), pp. 391–403, figs. 15.*)—In this paper the author reports data on the following: (1) The resistivity of different soil types, both air-dried and saturated; (2) the resistivity and conductivity of soils for different percentages of water from 10 to 20; (3) the conductivity of solutions in the soil; and (4) the effect of texture and organic matter, or humus, upon the conductivity.

"The measurements of soil resistivity show: (1) That in the dry condition, the soil offers a very high resistance to the passage of the current; (2) that at a depth of 2 ft. or more for a given soil and area, the conductivity remains roughly constant; (3) that the conductivity of moist soil increases almost directly as the percentage of moisture increases, the amount of increase depending upon the type of soil; (4) that the conductivity of soils saturated with water increases directly as the amount of salt in solution increases; (5) that below saturation, the resistivity increases almost in proportion to the surface area of the soil; at saturation and beyond, the surface area does not exert so great an influence; (6) that sodium carbonate has an effect of greatly increasing the conductivity; (7) that humus decreases the conductivity of a soil; (8) sandy soil will probably afford least electrolyte and clay soil most, due mostly to the state of physical division of the soil."

The author is of the opinion that from the data given "it would be possible to calculate roughly the electrolysis (current passing) produced by a given potential difference between two points in the soil, the cross-section of the soil column involved being known. In such a calculation the texture, content of organic matter, water content, and saturation point of the soil must be approximately known, as well as the content of soluble salts present in the soil solution."

Data on the chemical composition of alkali soils, N. STEPANOV (*Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 1, pp. 52–75*).—Analyses were made of extracts with hydrofluoric acid, sulphuric acid, 10 per cent hot hydrochloric acid, 1 per cent cold hydrochloric acid, and water from loamy chernozem and black alkali soils from Samara.

In all acid extracts a marked increase in sesquioxids, magnesia, and alkalis, especially sodium, was noted in the surface layer of the alkali soils. The aqueous extracts of the alkali soils also showed a high sodium content in comparison with the chernozem soils. The characteristics of the aqueous alkali extracts were difficulty of clarification, intensity of color (being that of strong tea), high state of alkalinity, and very small content of lime, sulphuric acid, and chlorin. The alkalinity decreased with the increase of sulphuric acid, a fact confirmed in a plat experiment with gypsum. The mechanical analysis showed a marked increase of fine soil particles in the surface layers of the alkali soil.

Experiments in wide glass tubes on the rise of water in the alkali soil showed that the water rose only 55.2 cm. in 155 days.

Chemistry, physics, and biology of the soil, M. HOFFMANN (*Jahresber. Landw., 24 (1909), pp. 7–50*).—Recent investigations on this subject are classified and reviewed.

Report on the work of the soils section of the Institute for Agricultural Plant Production of the University of Breslau, 1902–1909, P. Ehrenberg (*Mitt. Landw. Inst. Breslau, 6 (1910), No. 1, pp. 1–32*).—This is a review of the chemical, physical, and bacteriological investigations on soils which have been carried on at this institution, including particularly the investigations of Pfeiffer, Ehrenberg, et al., on fertilizers, green manures, rotations and fallows, nitrogen economy of soils, soil inoculation, physical (especially colloid) properties of soils, irrigation, and effect of zinc in pot cultures. Lists of the principal papers reporting these investigations are given.

Characteristics of the newer methods of geological-agronomical soil mapping, H. Gruner (*Deut. Landw. Presse, 37 (1910), Nos. 72, pp. 779–781; 73, p. 794; 74, pp. 804, 805, fig. 1*).—This article discusses the development and significance of geological-agronomical soil mapping, as well as the views of various investigators, particularly Reiss and Koehne, as to what such maps should include.

Bibliography of North American geology for 1908, with subject index, J. M. Nickles (*U. S. Geol. Survey Bul. 409, pp. 148*).—This contains a list of serials examined, a bibliography arranged alphabetically by authors, a subject index, and lists of chemical analyses, minerals, rocks, and geologic formations referred to.

Barium in soils, G. H. Failyer (*U. S. Dept. Agr., Bur. Soils Bul. 72, pp. 23, pl. 1*).—This bulletin reviews the literature relating to the occurrence of barium in soils and reports the results of determinations of barium in a number of samples of soils, especially of the Great Plains, and of other parts of the United States. These results indicate "that barium is a widely disseminated element and is present in most soils throughout the United States, and in larger quantities, as would be expected, in soils derived from masses carrying barite deposits and in the soils derived from the rocks of the Rocky Mountains.

"The soil moisture may be expected to carry small amounts of barium. In all cases the feldspars of the igneous rocks from which the soil material has been derived seem to be an original source of the barium of soils."

The adaptation of the plant to the soil, A. D. Hall (*Jour. Roy. Hort. Soc. [London], 36 (1910), No. 1, pp. 1–21, figs. 11*).—The variation of plant growth with the character of the soil is illustrated by the changes which the natural herbage has undergone in the course of 48 years on plats of Rothamsted soil treated in different ways.

A study of these soils indicates the difficulty of correlating the plant with the composition of the soil upon which it grows. The author therefore presents a study of the distribution of a few crops over a small range of country, namely, the distribution of fruit, hops, barley, and potatoes in the counties of Kent, Surrey, and Sussex. Mechanical analysis of the soils shows a great similarity of type, regardless of geological origin, of the soils on which these crops are grown in different localities.

The conclusion is reached that the structure of the soil as revealed by mechanical analysis is the chief of the causes determining the association of given plants with a given soil because on the size of particle and structure depend the water supply, temperature, and humidity.

Of the secondary factors which determine the association of plants and soils the reaction of the soil is probably the most important, since the microflora which plays so large a part in the nutrition of the higher plants are determined almost entirely by the acidity or alkalinity of the soil. It is this fact that explains in large part the effect of the lime content of soils upon the character of vegetation.

"On the other hand, it can hardly be doubted that there is what we might call a positive calcareous factor, so specially associated are certain plants with soils rich in carbonate of lime, and so entirely are they absent from other soils which are perfectly neutral, but which contain only a small proportion of carbonate of lime." Nevertheless, in experiments at Woburn and Rothamsted it was found that certain typical lime-heating leguminous plants grew equally well on sand containing practically no carbonate of lime and on soil that was well stocked with lime. Analysis showed the ashes of the plants grown at the two places to contain similar amounts of lime. The lime therefore appears to be a positive and not a negative factor especially favoring the growth of certain plants at the expense of others.

Reference is made to observations indicating the possibility of bringing about teratological changes by adding particular constituents, as for example, zinc, to soils.

Contribution to the question of the nitrogen balance, V. VINER (*Otchet Shatilov. Selsk. Khoz. Opuitn. Santzii, 4 (1909), pt. 2, pp. 44–63; abs. in Zhur. Opuitn. Agron.* (*Russ Jour. Expt. Landw.*), *11 (1910), No. 1, p. 83*).—In the atmospheric precipitations the soil received during the growing period about 6.68 lbs. of nitrogen per acre. In the run-off the nitrogen content was very high, indicating a loss of nitrogen compounds from the upper layer of the soil. In well water the nitrogen content was also large, from 5 to 15 mg. per liter, increasing in the autumn months and decreasing in the winter. In river water minima of nitrogen were observed in both the winter and summer months and a maximum in the spring, the mean being about 2 mg. per liter.

In the soil the nitrogen content fluctuated from 60 to 160 mg. per 1,000 gm. of dry soil, the influence of cultivated plants not being clearly defined. It was observed, however, that on the fallow during the summer the increase of nitrogen in the tilled layer was considerable (from 173 to 327 mg.). The influence of manure was indicated by an increase to 84 mg. On clover fields the increase during 3 years rose to 115 mg. The total increase of nitrogen in the cultivation of clover, determined by the analysis of the root residues, amounted toward the end of the first year to about 36.47 lbs. per acre, and toward the end of the second year to 58.51 lbs. per acre. The determination of the assimilable nitrogen by means of pot experiments gave approximately the same figures as in the field. The author concludes that the soil of the station does not require a nitrogen fertilizer if the proper conditions are maintained.

Progress and present status of the knowledge of fertilizers, H. IMMENDORFF (*Mitt. Ökonom. Gesell. Sachsen, 1909–10, pp. 89–105*).—This is a review of the more important advances in knowledge of soil fertility and its maintenance by means of manures, fertilizers, and soil bacteria, containing a brief critical discussion of the more important theories of soil fertility, including that of the Bureau of Soils of this Department.

Fertilizers and fertilizing, M. HOFFMANN (*Jahresber. Landw., 24 (1909), pp. 50–81*).—Recent investigations on this subject are classified and reviewed.

Fertilizer experiments as a means of determining the productiveness of soils, A. STUTZER (*Mitt. Deut. Landw. Gesell., 25 (1910), No. 38, pp. 560–562*).—Plans for fertilizer experiments to determine the productiveness of soils, especially for winter cereals and grass, are described.

Fundamental questions of fertilizing on chernozem, S. L. FRANKFURT (*Dnevn. XII. S"iezda Ross. Est.-Isp. i Vrach., No. 5, p. 196; abs. in Zhur. Opuitn. Agron.* (*Russ. Jour. Expt. Landw.*), *11 (1910), No. 1, pp. 105, 106*).—Field tests made on chernozem soils in a number of different districts showed that manure had considerable effect on the yield of winter wheat and especially on that of the succeeding crop of beets. Other experiments have shown that the action of the mineral constituents of manure is determined by the action of the phosphoric acid contained in the latter. The more marked the action of manure the more marked was the action of phosphatic fertilizers. Small amounts of manure in combination with phosphates (Thomas slag and superphosphate) gave as large yields as large amounts of manure. The nonaction of nitrogen on chernozem is accounted for by the striking nitrifying capacity of chernozem.

Analyses of fertilizing materials, V. VINER (*Otchet Shatilov. Selsk. Khoz. Opuitn. Stantzii, 4 (1909), pt. 2, pp. 63–71; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 1, pp. 101, 102*).—This investigation is mainly concerned with the composition of manure in relation to the time of hauling to the field, the degree of decomposition, the kind of animal, leaching, and origin.

Manure hauled out in the winter was found to be richer in nitrogen and phosphoric acid than that hauled out in the summer. In the process of decomposition of the manure there is an increase in the percentage of ash, nitrogen, and phosphoric acid, although about one-third of the total nitrogen is lost. The influence of the kind of animal was masked by that of other factors. Cow manure, being more moist, underwent more decomposition than horse manure. Comparing the composition of manure when hauled out in the winter with the same manure before plowing under in May, it was found that besides a considerable loss of dry matter (28 per cent), the phosphoric acid content had decreased to one-third and the nitrogen content to one-half.

Composition of the urine and dung of the more important animals, A. STUTZER (*Fühling's Landw. Ztg., 95 (1910), No. 13, pp. 450–452*).—The author reports the average results of a number of analyses of the fresh dung and urine of cows, horses, sheep, and swine.

The average nitrogen content of dung and urine of cows given feed not specially rich in nitrogen was decidedly greater than that usually given, and about as high as that for dung and urine of horses and sheep. The average nitrogen content of the urine of sheep was lower than that usually given. The percentage of potash in the swine manure was unusually high as a result of the liberal use of potatoes in the rations, amounting to 9.5 parts per 1,000 in the urine and 7 parts in the dung. These figures were reduced to 8 and 5, respectively, in the averages adopted, as shown in the following table:

Average composition of fresh dung and urine of farm animals.

[Parts per 1,000.]

	Fresh urine from—				Fresh dung from—			
	Sheep.	Horses.	Cows.	Swine.	Sheep.	Horses.	Cows.	Swine.
Water	903.00	926.00	923.00	966.00	680.00	750.00	835.00	800.00
Organic matter	70.00	47.00	57.00	23.00	295.00	230.00	150.00	160.00
Nitrogen:								
Total	15.80	15.20	15.00	6.40	6.20	5.60	5.90	6.00
Soluble	15.80	15.20	15.00	6.40	.50	.50	.60	.80
Phosphoric acid:								
Total	1.30	.05	1.50	1.60	3.00	3.00	2.80	6.00
Soluble	1.30	.05	1.50	1.60	......	......	......	.50
Potash	18.50	16.50	15.50	8.00	1.70	3.30	1.40	5.00
Lime	1.80	3.20	.30	.10	4.00	2.30	2.40	.50
Magnesia	2.50	2.40	.10	.80	2.40	1.00	1.80	.20
Sulphuric acid	1.00	1.60	.30	2.70	1.40	.50	1.20	.60
Chlorin	3.80	3.00	1.00	1.00	1.00	.10	.10	.10

The influence of green manuring with mustard and peas at various stages of growth and of different kinds of nitrogen manuring on denitrification, A. BARTELS (*Jour. Landw., 58 (1910), No. 2, pp. 143–198, pls. 4*).—A series of pot experiments are reported which for the most part gave inconclusive results. The attempt to trace some definite relation between denitrification and the amount of pentosans supplied to the soil by the different methods of manuring was not entirely successful on account of the important part played by other factors in determining the yield.

The fixation of atmospheric nitrogen (*Sci. Amer. Sup., 70 (1910), No. 1814, pp. 233, 234, figs. 6*).—This is a brief account of the Pauling process of the electric fixation of nitrogen as used in a factory at Patsch, near Innsbruck, Austria.

The nitrogen of the air.—Waterfalls and agriculture, L. GRANDEAU (*Jour. Soc. Cent. Agr. Belg., 57 (1910), Nos. 6, pp. 174–176; 7, pp. 199, 200; 8, pp. 222, 223*).—This is a review of the development and present status of the various processes which have been proposed for the utilization of cheap water power in generating electricity for the manufacture of nitrogenous fertilizers from the free nitrogen of the air.

Progress in potash industry, H. HOF (*Chem. Ztg., 34 (1910), No. 50, pp. 445, 446*).—The various recent contributions to the geology, mineralogy, chemistry and technology of this industry are noted.

Potassium silicate as a source of potash for plants, D. N. PRIANISHNIKOV and A. G. DOYARENKO (*Dnevn. XII. S"iezda Ross. Est.-Isp. i Vrach., No. 8, p. 345; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 1, p. 107*).—A species of nepheline from the coast of the White Sea proved to be a good source of potash for plants, but as this species also contains biotite, and muscovite and biotite proved to be better sources of potash in sand cultures than elæolite, it is possible that its action is due to the presence of biotite. The group of feldspars (orthoclase, microcline, sanidine) were of very little value as potash food. Leucite was also of much less value in this respect than the samples of biotite (especially micaceous schists) used. The potash of hydrous silicates which were used in some of these experiments was much less available than that of other silicates tested.

Potassium silicate, BREHMER (*Gartenwelt, 14 (1910), No. 19, pp. 220–222, figs. 3*).—Potassium silicate (phonolite) was compared with 40 per cent potash salt on various kinds of vegetables and flowers. The results as reported are generally favorable to the silicate.

Economic geology of the feldspar deposits of the United States, E. S. BASTIN (*U. S. Geol. Survey Bul. 420, pp. 85, pls. 8*).—"The present bulletin brings together in a single volume all available practical information concerning the commercial feldspar deposits of the United States. Scientific problems are discussed only so far as they are of commercial importance or so far as the discussion may contribute to a general understanding of the deposits." Deposits of economic importance in Maine, Massachusetts, Connecticut, New York, Pennsylvania, Maryland, Virginia, Wisconsin, Minnesota, and Texas are described.

Reference is made to the interest aroused in the use of potash feldspar as a fertilizer by the work of A. S. Cushman of this Department (E. S. R., 19, p. 322) on the availability of the potash of ground feldspar and on methods of extracting the potash. It is stated that of the various processes of extraction which have been patented none has yet been successfully applied on a commercial scale.

A review of the phosphate fields of Idaho, Utah and Wyoming, W. H. WAGGAMAN (*Amer. Fert., 33 (1910), No. 5, pp. 7–15*).—This is a summary of investigations which have been more fully reported elsewhere (E. S. R., 23, p. 426).

Phosphates, H. S. GALE, R. W. RICHARDS, and E. BLACKWELDER (*U. S. Geol. Survey Bul. 403-H, pp. 99, pls. 10, figs. 7*).—The principal article in this bulletin is a preliminary report on the phosphate deposits in southeastern Idaho and adjacent parts of Wyoming and Utah. This is based upon geological and topographical surveys made during the summer of 1909, the area examined comprising parts of Bear Lake County, Idaho, Uinta County, Wyo., and Rich, Weber, and Morgan counties, Utah. As a result of this work the total area now withheld from public entry is 2,551,399 acres as compared with 4,541,300 acres withdrawn by the Secretary of the Interior in 1908 pending an examination of the phosphate resources of the district. The estimated tonnage of available high grade (70 per cent) phosphate in the area examined is given as follows: Georgetown area 90,000,000 long tons, Montpelier-Bennington area 16,000,000, Hot Springs-Dingle area 27,000,000, Sublette Mountain area 32,000,000, Cokeville area 2,400,000, Beckwith Hills area 2,800,000, Crawford Mountain area 90,000,000, and the Laketown area 6,750,000, making a total of 266,950,000 long tons. There is in addition a large amount of intermediate and low grade phosphate which might eventually be used to advantage. Analyses of 4 representative samples of the high grade phosphate showed phosphoric acid ranging from 27.32 to 36.35 per cent, alumina from 0.50 to 0.97 per cent, ferric oxid from 0.26 to 0.73 per cent, and lime from 45.34 to 50.97 per cent.

A list of Geological Survey publications on phosphates and other mineral fertilizers is appended. For abstracts of other reports on the phosphate deposits described in this bulletin see previous notes (E. S. R., 21, p. 25; 23, p. 426).

Preliminary report of the phosphate deposits in southeastern Idaho and adjacent parts of Wyoming and Utah, H. S. GALE and R. W. RICHARDS (*Amer. Fert., 33 (1910), Nos. 6, pp. 9–13, fig. 1; 7, pp. 9–16C, figs. 5; 8, pp. 11–18, figs. 2; 9, pp. 11–19, figs. 3; 10, pp. 14–20, figs. 2*).—An abbreviated reprint of a portion of the above bulletin.

Phosphate deposits east of Ogden, Utah, E. BLACKWELDER (*Amer. Fert., 33 (1910), No. 11, pp. 13–18, figs. 4*).—An abbreviated reprint of a part of the Geological Survey bulletin referred to above.

Chemical treatment of Russian phosphorites, D. N. PRIANISHNIKOV (*Dnevn. XII. S"iezda Ross. Est.-Isp. i Vrach., No. 8, p. 342; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 1, pp. 106, 107*).—By means of pot tests conducted since 1896 it has been established that for the majority of plants and for most soils (except podzols and peat soils with acid reaction) phosphorites can not serve as phosphatic fertilizers directly, but must first be subjected to technical treatment, various processes of which are described.

Phosphatic fertilizers, RIGAUX (*Jour. Soc. Cent. Agr. Belg., 57 (1910), No. 7, pp. 193–199*).—This article describes different kinds of phosphates and discusses their fertilizing value. Attention is especially called to a phosphate which is prepared by subjecting insoluble mineral phosphates to a high temperature, thereby increasing the availability of the phosphoric acid.

Effects of soluble salts on insoluble phosphates, J. E. GREAVES (*Jour. Biol. Chem., 7 (1910), No. 4, pp. 287–319; abs. in Chem. Zentbl., 1910, I, No. 18, p. 1631*).—This article reviews investigations on the action of nitrates, ammonium salts, lime, salt, and iron sulphate on the solubility of phosphates and reports laboratory experiments by the author which showed that calcium and iron salts decreased the solubility of the phosphates, that sodium, potassium, and ammonium phosphates, ammonium chlorid and nitrate and magnesium nitrate increased the solubility of calcium phosphate, and that sodium and potassium sulphates decreased the solubility of iron phosphate. The action of magnesium sulphate and sodium, potassium, and magnesium chlorids was small and varied with the kind of phosphate. The addition of soil increased the solvent action of the various salts, especially that of ammonium nitrate.

The method of procedure in these experiments was to treat 2 gm. of the phosphate with 500 cc. of 1 per cent solution of the various substances used except in the case of calcium sulphate, which was used in saturated solution. The mixture of solvent and phosphate was allowed to stand for from 10 to 14 hours with occasional shaking.

The article contains a bibliography of 59 references to the literature of the subject.

Effect of lime upon the solubility of soil constituents, E. W. Gaither (*Jour. Indus. and Engin. Chem., 2 (1910), No. 7, pp. 315, 316; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 15, p. 967*).—Experiments are here reported from which the author concludes that "lime renders insoluble phosphates in the soil soluble, by replacing iron and aluminum, which is in combination with the phosphorus and renders all three more soluble in fifth-normal nitric acid. Lime breaks up certain silicates in soils and renders them more soluble in fifth-normal nitric acid, but does not act upon insoluble potassium compounds in the soil to such an extent that fifth-normal nitric acid can be used as a measure of such potassium. The addition of caustic lime to soils has the effect of diminishing the amount of potash assimilated by wheat grown on such soils. The theory held 'that lime added to the soil increases the amount of available potash in the soil' is either erroneous, or requires more positive proof than has heretofore been obtained before it can be accepted."

Magnesia in agriculture, Rigaux et al. (*Jour. Soc. Cent. Agr. Belg., 57 (1910), Nos. 5, pp. 111–118; 7, pp. 188–192*).—The results of experiments by various investigators are cited to show that magnesia is an indispensable and very important element in the growth of plants.

Experiments on the fertilizing value of manganese sulphate, A. Carlier and Clausen (*Ann. Gembloux, 20 (1910), No. 8, pp. 423–426; Illus. Landw. Ztg., 30 (1910), Nos. 74, p. 701; 77, p. 729*).—Field experiments on grass, potatoes, and beets with varying amounts of manganese sulphate in combination with other fertilizing materials did not show any appreciable benefit from the use of the sulphate as far as increased yields were concerned. The use of the sulphate on grass was followed by a very marked improvement in the color of the grass but there was no ultimate increase in yield.

Commercial fertilizers, W. J. Jones, Jr., E. G. Proulx, and C. W. Rice (*Indiana Sta. Bul. 148, pp. 631–726, map 1*).—This bulletin contains a summary of the Indiana fertilizer law, notes on the administration of the law, a map showing the distribution of the fertilizer trade in the State, estimated sales in 1909 as compared with 1908 and 1900, a brief statement regarding home mixing of fertilizers, a review of the results of inspection for the 8 years 1902 to 1909, and a report of the results of inspection in 1909, including analyses of 970 samples of fertilizing materials representing 85 companies. A comparison is also made of the standing of different manufacturers with regard to compliance with guaranties, and prices used in the valuation of fertilizers are given.

"The results of the inspection continue to show improvement over that of previous years and taken as a whole the samples secured in 1909 more nearly meet the requirements of the law than those secured in any previous year covered by the inspection . . . . Based on the number of samples analyzed the results justify the conclusion that in the majority of cases manufacturers are maintaining their guaranties," although "the results still indicate that too many manufacturers are careless in mixing and controlling the fertilizer shipped into this State."

It is stated "that some of the most successful consumers of fertilizer in the State are purchasing the raw materials and mixing their own fertilizer either in wagon beds or other vessels or on the barn floor in a manner similar to that used in mixing concrete. There is no logical reason why fertilizer can not be successfully mixed at home provided proper care regarding weights and thoroughness in shoveling and mixing the combined materials is exercised. As an evidence of what can be accomplished in mixing fertilizer without machinery, it is only necessary to call attention to the fact that until very recently two manipulators doing business in the State with records among the best have mixed their fertilizers on the floor of their factories."

To aid those desiring to mix their own fertilizers a list is given of the names and addresses of firms registering raw materials furnishing nitrogen and potash, raw rock phosphate, basic slag, tobacco dust, and dried manure for sale in Indiana.

Fertilizer analyses, H. B. McDonnell (*Md. Agr. Col. Quart., 1910, No. 49, pp. 32*).—The results of the spring inspection of fertilizers in Maryland, 1910, are reported.

Report of analyses of samples of fertilizers collected by the commissioner of agriculture during 1910 (*New York State Sta. Bul. 325, pp. 145–247*).—This bulletin reports analyses of samples of fertilizers collected during 1910, with "figures showing the current values of fertilizer ingredients, with an illustration of the method of applying these figures in determining the approximate commercial valuation of the different brands."

Analyses of fertilizers and cotton-seed meals, fall season, 1909, and spring season, 1910, B. W. Kilgore et al. (*Bul. N. C. Dept. Agr., 31 (1910), No. 7, pp. 123*).—This bulletin contains analyses of fertilizers and cotton-seed meals collected by the fertilizer inspectors of the state department of agriculture during the fall of 1909 and spring of 1910, as well as a list of brands of fertilizers registered for sale in 1910.

AGRICULTURAL BOTANY.

Climatology and vegetation in Colorado, W. W. Robbins (*Bot. Gaz., 49 (1910), No. 4, pp. 256–280, figs. 7*).—This paper describes the general topographic, physiographic, and climatological conditions of Colorado and gives a general view of the climatic conditions of different sections of the State in relation to the characteristic vegetation.

"In general it may be said that the State west of the continental divide is drier from the vegetation standpoint than the eastern slope. Only about 50 per cent of the rainfall on the western slope occurs during the growing season, in contrast with the occurrence on the eastern slope of about 75 per cent during the same period. Hence for any two localities east and west of the continental divide with equal annual precipitation amounts, the locality west will have the more xerophytic vegetation."

The theory of periodic mutations, Leclerc du Sablon (*Rev. Gén. Bot., 22 (1910), No. 258, pp. 266–276; abs. in Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 4, pp. 330–332*).—The author discusses the mutation theory of de Vries as applied to *Œnothera lamarckiana*, and arrives at the conclusion that the mutations should be considered as the result of a natural hybrid of this plant. The behavior of the seedlings of this plant is said to conform to the Mendelian theory of hybrids as developed by Bateson.

The transmission of characters without expression in vegetables, W. W. Tracy, Sr. (*Abs. in Science, n. ser., 32 (1910), No. 816, p. 256*).—The author gave an account of some studies of sweet corn in which White Cory, which bred true for many years although originating from a red form, was accidentally crossed with another white variety, also believed to be a sport from a red form, and the resultant cross showed color characters of the parent variety which had remained hidden for many years.

A somewhat similar case of unexpressed transmission was noted in a variety of cabbage.

The development of parasitic spermophytes, E. Heinricher (*Die Aufzucht und Kultur der parasitischen Samenpflanzen. Jena, 1910, pp. 53, figs. 8*).—The author describes the development and parasitism of about 20 genera of spermophytes, embraced in 7 families. The parasitism of some of these has been previously noted (E. S. R., 23, p. 628, 727).

The lichens of Minnesota, B. Fink (*U. S. Nat. Mus., Contrib. Nat. Herbarium, 14, pt. 1, pp. XVII+69, pls. 52, figs. 18*).—This is a taxonomic monograph of the lichens of Minnesota, including keys and descriptions of 68 genera and about 440 species and varieties.

Annual review of mycology, P. Vuillemin (*Rev. Gén. Sci., 21 (1910), Nos. 10, pp. 432–443; 11, pp. 473–484*).—In the first paper, which is on fungi in general, the author discusses the recent articles on the affinities of the fungi to other plants, their chemical composition, and the relation (saprophytic, parasitic, symbiotic, etc.) of fungi to their hosts.

In the second paper the author reviews the work of various authors on special subjects of research, such as the generic position of the root tubercle micro-organisms of the legumes and of Eleagnus, cytology and biology of certain Myxogastres, the affinities of the Myxobacteriaceæ and the Myxochytridineæ, sexual studies on certain of the Mucorineæ and Uredineæ, the cytology of the Basidiomycetes, the affinities of the Laboulbeniaceæ, and sexual and taxonomic studies on certain other Ascomycetes.

On soil bacteriology, A. Dzierzbicki (*Bul. Internat. Acad. Sci. Cracovie, Cl. Sci. Math. et Nat., 1910, Nos. 1, pp. 21–64; 2, pp. 65, 66*).—The results are given of investigations on (1) the relationship of the bacteriological conditions of soils in regard to the available food elements they contain, (2) the relationship of nitrogen fixation to the composition of the inoculating soil material, (3) the relationship of the form of the foodstuffs in the culture media to nitrogen fixation, (4) the ratio of the amount of fixed nitrogen to that of the utilized sources of energy as regards the quantity of available phosphoric acid present in the solution, (5) the occurrence of Azotobacter in certain garden soils, (6) decomposition processes and ammonification, and (7) the influence of different organic substances on ammonification in peptone solutions.

It was found that the Remy method of bacteriological soil investigations (E. S. R., 15, p. 859) gave trustworthy results on the bacteriological condition of the soil only when the composition of the nutrient solution was such that the inoculating soil material influenced the performance of the process only through its bacteriological conditions and not by its chemical composition. The bacteriological condition of the soil with reference to nitrogen fixation was found to depend to a great degree on the character and amount of mineral foodstuffs in the soil. If the soil was deficient in available lime, phosphoric acid, or potash, nitrogen-fixing bacteria, such as Azotobacter, were either entirely absent or present only in small quantities. If mannit is used as a culture medium then not only must the required mineral elements be present, but also humus material before sterilization and inoculation with the Azotobacter. It was found that dipotassium phosphate was as suitable for the Azotobacter nutrient media as monocalcium phosphate plus hydrochloric acid. The smaller the amount of phosphoric acid present for the development of the Azotobacter, the less economical was the consumption of the source of energy in the nitrogen fixation.

In the experiments on ammonia cleavage in peptone solutions, it was found that the intensity of such cleavage depended not only on the bacterial flora of those soils, but more so on their chemical composition and especially on the presence of phosphoric acid. In Remy's method of investigating decomposition processes it was found necessary to add to the peptone solution an easily assimilable phosphoric acid compound (as dipotassium phosphate) for the use of the bacteria. The addition of easily assimilable organic matter (as carbohydrates) to the peptone solution inoculated with earth decreases the amount of ammonia formed, while the addition of small amounts of some humic acid salt increases it. A strong aeration decreased, at least in many cases, the quantity of ammonia split off from the peptone solution which had been inoculated with earth.

A method for the determination of the cellulose-fermenting ability of soil organisms, H. R. Christensen (*Centbl. Bakt.* [*etc.*], *2. Abt.*, *27* (*1910*), *No. 17–21, pp. 449–451*).—The author describes in detail a method for determining the disintegrating ability of cellulose-fermenting organisms of various soils. This consists in placing narrow strips of ash-free filter paper in a 300 cc. Erlenmeyer flask with 50 gm. of the well pulverized and thoroughly moistened soil, and observing the rate of disintegration of the filter paper.

Investigations on the occurrence of Azotobacter in moor soils, H. von Feilitzen (*Fühling's Landw. Ztg.*, *59* (*1910*), *No. 14, pp. 489–492*).—Observations on samples of soils from the Flahult experimental farm varying in lime content and acidity and in previous treatment indicate that Azotobacter occurs in very small numbers even in the best of the moor soils which have been under cultivation for a long time. No direct relation between lime content and development of Azotobacter could be established. Neither was any positive relation between such development and the reaction of the soil brought out by these observations.

On the mineral needs of Azotobacter, H. Kaserer (*Ber. Deut. Bot. Gesell.*, *28* (*1910*), *No. 6, pp. 208–212*).—It is claimed as a result of experiments that all bacteria need iron and aluminum for their proper growth.

This need is supplied by the usual organic media, and, therefore, is not observed until albuminoid-free media in the absence of organic acids are used, because the organic acids prevent the precipitation of the iron and aluminum compounds which exist everywhere, especially in glass. Experiments with different strains of Azotobacter show that this need of iron and aluminum varies very materially with the different strains.

Researches on the assimilation of free nitrogen by green plants, Eva Mameli and G. Pollacci (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat.*, *5. ser.*, *19* (*1910*), *I, No. 8, pp. 501–504*).—A preliminary statement is given of experiments on the assimilation of atmospheric nitrogen by some of the higher plants, in which it is claimed that certain plants (*Azolla caroliniana*, *Lemna major*, *L. minor*, *Salvinia auriculata*, *Anthurium* sp., *Tradescantia* sp., and *Salvia* sp.) when grown in air and media free from nitrogen compounds were able to grow vigorously and to absorb definite quantities of nitrogen from the atmosphere. Complete descriptions of the methods used and results obtained will be published later.

On the infection of serradella and other cultivated plants with several species of bacteria, L. Hiltner (*Illus. Landw. Ztg.*, *30* (*1910*), *No. 33, pp. 319, 320*).—The results are given of field experiments by various farmers on inoculating serradella with nitragin and also with bacteria which were isolated from the roots of serradella plants. It is claimed that beneficial results were obtained by the use of the isolated bacteria alone but especially when these were combined with the nitragin cultures.

The duration of the vitality of seeds of Orobanche crenata, N. PASSERINI (*Atti R. Accad. Econ. Agr. Geogr. Firenze, 5. ser., 7 (1910), No. 1, pp. 1–7*).—Experiments are reported in which the germination of seeds of *O. crenata* was tested in pots, the study being continued for 14 years. As a result the author found that the seed lost practically all germinative ability after lying in the soil for 8 years.

The anatomy of some tubers, T. REED (*Ann. Bot.* [*London*], *24* (*1910*), *No. 95, pp. 537–548, pls. 2, dgms. 4*).—Attention is called to the fact that but little investigation has been carried on on the anatomy of tubers, and the author gives an account of studies made on the tubers of the potato and the artichoke.

The tubers of the potato are said to arise as terminal swellings on long underground stems or stolons, which arise in the axils of the lower leaves of the main shoot and grow more or less horizontally outward, swelling sooner or later at the tips to form tubers. The artichoke tubers arise as swellings on the underground stems or stolons, which spring from the axils of scale leaves at the base of the main shoot. The stolon may swell up at once and become a tuber, or it may greatly elongate and give rise to a number of lateral tubers, finally terminating itself in a tuber.

The principal difference in development between the two is that the potato tubers are never formed laterally, as in the case of the artichoke. In structure the potato tuber is formed mainly from medullary parenchyma and from the parenchyma between the xylem and the medullary phloem. The latter source is largely responsible for the scattered distribution of the medullary phloem strands in the tuber. The medullary phloem probably serves as the channel for carrying food material to the parenchymatous portion of the tuber, which is covered by a layer of cork developed from the hypoderma. The tuber of the artichoke differs from that of the potato in that it is made up of medullary parenchyma, xylem, and medullary ray parenchyma. In neither of the tubers is there much, if any, secondary lignification of elements.

Experimental researches on vegetable assimilation and respiration, VI, D. THODAY (*Proc. Roy. Soc.* [*London*], *Ser. B, 82* (*1910*), *No. B 557, pp. 421–450, figs. 3*).—An account is given of studies on assimilation in the open air, the method used that employed by Sachs in which the dry weight of half the leaf was used, but so modified as to make it more accurate. The material experimented upon was sunflower and catalpa leaves.

It was found that in the open air high rates of assimilation occur, although there is but a small concentration of carbon dioxid in the atmosphere. In the experiments with the sunflower, which agreed very closely among themselves, leaves which remained turgid, and so kept their stomata widely open, showed an average net increase of nearly 17 mg. per hour in their dry weight per square decimeter. If a moderate allowance is made for the assimilation of the carbon dioxid produced in respiration, the photosynthetic products reach a total of about 18 mg. per hour. The rate of production is not uniform, at times exceeding the average.

The limiting factor of assimilation is the internal leaf temperature when the stomata are open enough to allow carbon dioxid assimilation, providing the temperature does not exceed 23 to 25° C. When the sunflower leaves lost their turgidity the rate of assimilation was considerably diminished.

Compared with the sunflower, the catalpa assimilated at a much lower rate, a fact which is correlated with the absence of stomata from the upper surface of the leaves. Under the conditions which enabled the sunflower leaves to increase in dry weight 17 mg. per square decimeter per hour, the catalpa leaves showed an increase of only 5 or 6 mg.

These results were obtained with detached leaves of the plants, and it remains to be determined whether leaves still attached to the plants assimilate at equally high rates.

Attention is called to the experiments of Broocks with sugar beets, which proved that translocation proceeds during the day.

The author hopes to carry on some experiments to obtain conclusive evidence as to the concurrent action of assimilation and translocation.

On the absorption of water by the seeds of Vicia faba, A. S. Horne and Susanna Coull (*Proc. Univ. Durham Phil. Soc., 3 (1909–10), No. 5, pp. 267–280, pl. 1, dgms. 6*).—Attention is called to the trough-like organ present in the hilar region of the testa of leguminous seeds, and some experiments are reported in which the rôle of this organ in water absorption was tested.

The author found that a considerable portion of water was absorbed directly through the testa of the seeds of *V. faba*, the curves of the unsealed seeds and those having the hilum and micropyle covered with wax being almost parallel. With leguminous seeds having as permeable a testa as the broad bean, it is probable that the scar plays an inconsiderable rôle in the direct absorption of water, although with seeds having a less permeable testa it may be of some importance.

The presence of a glucosid in the leaves of the pear, E. Bourquelot and Mlle. A. Fichtenholz (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 1, pp. 81–84*).—The authors report the occurrence in the fresh leaves of several varieties of pear of a glucosid which from their studies is believed to be arbutin.

Starch content of leaves dropped in autumn, L. L. Harter (*Abs. in Science, n. ser., 32 (1910), No. 816, p. 256*).—The author reports finding from 6 to 14 per cent of starch in dropped leaves of Liquidambar, Ginkgo, Styrax, and oaks, a fact which seems to indicate that all food materials in leaves do not undergo translocation in autumn, as is commonly believed.

The influence of copper sulphate and manganese sulphate upon the growth of barley, Miss W. E. Brenchley (*Ann. Bot. [London], 24 (1910), No. 95, pp. 571–583, pl. 1, dgms. 4*).—The author has carried on a series of experiments to test the theory that chemical substances which are deleterious to plant growth universally act as stimulative agents if available in exceedingly minute quantities. The experiments were carried on with barley germinated and then transferred to water cultures containing various dilutions of copper sulphate and manganese sulphate.

The action of plant poisons in dilute solutions was found to be masked by the presence of nutrient salts, which enable the plants grown in such solutions as water cultures to endure a much greater concentration of the toxic substance than in the absence of nutrients.

Copper sulphate, which was found to be a definite poison to barley, does not have any stimulative effect in very dilute solutions, even at as low a concentration as 1 part copper sulphate to 10,000,000. Manganese sulphate, though not an actual poison to barley, retards the growth very materially if supplied in moderate quantities. Minute traces of the salt had a decided stimulative action both on the roots and shoots. When supplied in sufficient concentration the manganese was found to be taken up by the plant and deposited in its lower leaves.

On the toxicity of certain salts toward green leaves, L. Maquenne and E. Demoussy (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 3, pp. 178–182*).—The authors describe a method of determining the toxicity of salts toward plants in which leaves are floated in the solutions and the blackening of the tissues noted. In the experiments aucuba, privet, and pear leaves were placed in titrated solutions of various chemicals. Where the leaves were entire the changes took place very slowly, but if the margins of the leaves were cut, or if fragments of the leaves were used the effect of the salts was noticeable in a relatively short time. This method was found to be sufficiently sensitive to show within 24 hours the toxicity of a solution containing 1 part of copper to 5,000,000.

In studying alkaline salts, stronger solutions were used, and it was found that the blackening of the leaves was an accurate index of the relative poisonous properties of the different salts tested.

Some effects of a harmful organic soil constituent, O. SCHREINER and J. J. SKINNER (*U. S. Dept. Agr., Bur. Soils Bul. 70, pp. 98, pls. 4, figs. 31*).—In this bulletin the authors report on the effects of dihydroxystearic acid, a harmful constituent of soil, upon plant growth and upon soil solutions and fertilizer action. The experiments were conducted with wheat seedlings grown in cultures containing phosphoric acid, nitrogen, and potash in various ratios, 50 parts per million of dihydroxystearic acid being added to each set of cultures.

The difference between the cultures containing this acid and those without the substance is stated to have been very marked. In addition to the general appearance of the tops, marked changes were noticed in other parts of the plant, which seems to show that the roots form on the whole a better physiological indicator of toxicity than the growth of the tops.

After describing their experiments in detail the authors summarize their investigations, pointing out that dihydroxystearic acid hinders the growth of wheat plants when it is present in solution in pure distilled water, and that the compound is also harmful in the presence of nutrients or fertilizer salts in all ratios of the fertilizer elements phosphoric acid, nitrogen, and potash. The compound was found to be more harmful in those ratios of fertilizers not well suited for plant growth. It appears to be relatively much less harmful in the presence of nitrogenous fertilizers than with those composed mainly of phosphates and potash. The compound was found to modify both the amount and ratio of the fertilizer elements removed from soils, the ratio being higher for nitrogen. Fertilizer combinations which tend to increase root oxidation are deemed the best combinations to overcome the harmful effects of the acid.

Some effects of a harmful organic soil constituent, O. SCHREINER and J. J. SKINNER (*Bot. Gaz., 50 (1910), No. 3, pp. 161–181, figs. 11*).—A briefer account of the investigations noted above.

The influence of iron on the formation of spores of Aspergillus niger, B. SAUTON (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 3, pp. 241–243*).—In studies of *A. niger* grown in culture media it has been found that the fungus frequently did not produce spores, but the author has found that by adding iron to the solution, spore production followed in a relatively short period. In cultures of Aspergillus which had remained without spore production for 3 days with no iron present in the solution, the addition of iron salt was followed by the appearance of spores within 24 hours.

The formation of the spores appears to be an accompaniment of the fixation of oxygen, probably brought about through the intermediation of iron.

Recent observations on callose, L. MANGIN (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 4, pp. 279–283*).—The author gives an account of investigations which show that there is in fungi as well as in other plants, in addition to cellulose and pectic compounds, a substance to which he has given the name callose.

This substance has been studied and it is found to differ from cellulose and chitin in its rapid destruction in glycerin at a temperature of 300° C. and by the fact that it is not colored by iodin and has other color relations which distinguish it. It is found in many fungi and in addition occurs in the callus of the sieve tubes and in the membrane of the mother cells of pollen grains. It is also found widely distributed among thallophytes and algæ, but it is in the fungi that it occurs most abundantly.

Attention is called to the parallelism between this substance and that described by Tanret (E. S. R., 9, p. 921), to which the name fongose was given. The author decides that the two substances are identical but that the name callose has priority and should be adopted.

FIELD CROPS.

The complete farmer, P. McConnell (*London and New York, 1910, pp. XIV+432, pls. 4, figs. 54*).—This is a very comprehensive manual of information for the farmer. The principal subdivisions of the work deal with soils, crops, live stock, and farm equipment.

History and importance of electro-culture with special reference to the more recent experiments (*Arch. Deut. Landw. Rats, 34 (1910), pp. 535–570*).—This address discusses the effect of electricity on strawberries, beets, and other plants, and gives an especially full account of experiments conducted at Dahlem.

Demonstration farm reports, 1909, Pottawattamie County, P. G. Holden, A. H. Snyder, and A. E. Nelson (*Iowa State Col. Agr. Ext. Dept., Demonstr. Farm Rpt. 7, pp. 20*).—This publication states the results of experiments on a county farm.

Seed corn samples were secured for test from the planter boxes of 76 farms. The average yield secured was 36 bu. per acre; the average of the 5 highest samples 46.3 and of the 5 lowest 27.1 bu. The 3 highest yields from introduced varieties averaged 28.4 and the 3 lowest 23 bu. per acre, while the average from the 3 highest yielding samples submitted by seed companies was 38.8 and the average of the 3 lowest 29.2 bu. per acre.

Five kernels per hill produced a higher yield than plantings at lower rates in one test, while an average of 3½ kernels per hill produced the maximum yield in another. In this test the percentage of stand during September decreased with the increase in the rate of planting; the percentage of suckers varied irregularly; the percentage of barren stalks increased with the rate of planting, while the percentage of seed ears and of market ears decreased; and the percentage of nubbins and worthless ears increased.

An individual ear test conducted with 40 ears obtained from each of 3 farmers indicated "that there is an enormous difference in the producing power of ears in the same man's seed corn."

Results of experiments on Black Hawk County farm, 1909, P. G. Holden, A. H. Snyder, and A. E. Nelson (*Iowa State Col. Agr. Ext. Dept., Demonstr. Farm Rpt. 4, pp. 18*).—The general plan and results of the experiments reported are similar to those noted above. The 5 highest yields secured from farm seed in this county averaged 55.5 bu., the 5 lowest 39.7 bu. per acre; the 3 highest introduced varieties 52 and the 3 lowest 41.3 bu. The average yield of all farmers' varieties was 49.3 and of 14 introduced varieties 46.2 bu. per acre.

The results of the test of the number of kernels to plant per hill resembled those noted above except that the lowest percentage of suckers was obtained with the plantings averaging from 2 to 3½ kernels per hill, while the percentage of worthless ears was lowest after plantings averaging 2½ kernels per hill.

Demonstration farm reports, 1909, Delaware County, P. G. Holden, A. H. Snyder, and A. E. Nelson (*Iowa State Col. Agr. Ext. Dept., Demonstr. Farm

Rpt. 8, pp. 19).—The plan and general results of the experiments reported are similar to those noted on page 33.

The 5 highest yields secured from farmers' samples averaged 62 bu. per acre, and the 3 highest from the introduced varieties and seed companies' samples yielded 40 and 30 bu. per acre, respectively. The 5 lowest farmers' samples yielded 36, the 3 lowest introduced varieties 19, and the 3 lowest seed companies' samples 22 bu. per acre. The highest yield was obtained by planting an average of from 3 to 3½ kernels per hill.

Demonstration farm reports, 1909, Woodbury County, P. G. HOLDEN, A. H. SNYDER, and A. E. NELSON (*Iowa State Col. Agr. Ext. Dept., Demonstr. Farm Rpt. 6, pp. 18*).—The general plan and results of the experiments reported are similar to those noted above.

The average yield of the 5 highest yielding samples secured from farms was 63.8 bu. per acre as compared with 58.5 for the 3 highest yielding introduced varieties. The figures for the lowest yields were 37.1 and 45.8 bu. per acre, respectively. The 70 farmers' samples averaged 52.7 and the 14 introduced varieties 51.5 bu. per acre. The highest yields were secured from plantings averaging from 3 to 3½ kernels per hill. The percentage of seed ears secured varied irregularly and the percentage of barren stalks apparently decreased as the rate of planting increased.

[Experiments with field crops], D. A. GILCHRIST (*County Northumb., Ed. Com., Bul. 14, pp. 38–66*).—During the period 1906–1909, the Banner oat produced the highest average, 60¼ bu. per acre, among 16 varieties tested. The Blainslie variety had the finest straw for feeding purposes and will grow well on clay soil in a bad season, but is low in grain-producing power. Among 7 varieties of barley tested Kinver Chevalier and Maltster produced the highest yields of grain and straw. The weight per bushel and of 500 grains of each variety are given. Among 4 varieties of wheat tested in 1909, Browick Grey Chaff produced the highest yield of 40 bu. per acre. In a fertilizer test with beans the highest yield followed applications of (1) 10 tons dung, 6 cwt. slag, and 1 cwt. muriate of potash, and (2) 1 ton lime mud, 5 cwt. superphosphate, and 1 cwt. muriate of potash.

A report is given of a number of sowings of grass and clover seeds singly and in mixtures. Cocksfoot proved the best permanent grass but did poorly when sown alone. During 1905–1909 the Mammoth Long Red mangel produced the highest weight of roots and percentage of dry matter in a variety test. In a fertilizer test on mangels the greatest financial advantage was secured from applications of 12 tons of dung and 2 cwt. of common salt, together with a standard dressing of 510 lbs. of nitrate, 336 lbs. of 26 per cent superphosphate, and 300 lbs. of muriate of potash per acre. An application of salt apparently increased the yield by over 3¾ tons per acre. Applications of 2 tons of lime and 4 tons of lime mud per acre apparently decreased the yield by 2½ and 4½ tons per acre, respectively.

Plantings of potatoes were made on different dates from October 17 to May 2, and in 1906 the highest yield was secured from planting April 2, in 1908 from planting March 30, in 1909 from planting March 1, and in 1907 from a planting made on October 23 of the previous year. In another test sprouted tubers produced about 1⅓ times the yield produced by unsprouted tubers.

The percentage of dry matter in swedes was found to vary more within the same variety from year to year during 1900–1909 than did the different varieties during the same year. Early turnips produced heavier crops than swedes but contained little more dry matter per acre.

In tests with the finger-and-toe disease all applications of lime except that of gas lime proved effective. They were most effective in the fourth, fifth, and sixth years after application. Sulphate of lime and sulphate of zinc gave no results. Excellent results followed the use of 2 tons of ground lime or 3 tons of ground limestone. The disease proved more troublesome on thin clay than on light sandy soil.

Top-dressings of 112 lbs. of nitrate of soda and 139 lbs. of nitrate of lime, supplying 17½ lbs. of nitrogen each, produced yields of 38 and 46¾ bu. of oats respectively, while the straw yields were 16¾ and 23½ cwt. In another test 128 lbs. of lime nitrogen and 112 lbs. of sulphate of ammonia both excelled 140 lbs. of nitrate of soda during one season.

Progress reports of many investigations with different crops in 1910 are given.

[Experiments with farm crops], J. S. J. McCall and E. W. Davy (*Ann. Rpt. Agr. and Forestry Dept. [Nyasaland], 1910, pp. 5–8, 10–17, figs. 2*).—The selection work with cotton is discussed and a method of selection for the first 4 years' work recommended. The number of acres devoted in different districts to each of the principal crops is reported and the yield in 1910 estimated. A number of varieties of cotton were tested. Laguna corn proved drought resistant and yielded 2,000 lbs. of dried, husked ears per acre, while a check plat of local maize matured only small cobs. Ground nuts (*Arachis hypogea*) produced yields of from 1,200 to 1,500 lbs. per acre. The best yields followed level plantings from 15 to 18 in. apart each way.

Progress reports are given of plantings of soy beans, Florida beans, berseem (*Trifolium alexandrinum*), and *Crotolaria striata*.

On the flora of certain Cotswold pastures, R. G. Stapledon (*Agr. Students' Gaz., n. ser., 15 (1910), No. 1, pp. 5–12*).—A report is given of the flora found in 4 pastures. The plants are classed as Gramineæ, Leguminosæ, and included plants, and each of the 3 classes is further divided into the dominant, subdominant, abundant, frequent, sparse, and solitary varieties.

Experiments on permanent grass land, 1910, E. Kinch (*Agr. Students' Gaz., n. ser., 15 (1910), No. 1, pp. 12–15*).—In a fertilizer test on grass land applications of (1) kainit, superphosphate, and sodium nitrate, (2) kainit and ammonium sulphate, and (3) superphosphate and sodium nitrate apparently gave the most greatly increased yields. The effect of each of the fertilizer applications on the different grasses is reported.

Report on grass seed mixture experiments, 1906–1909, R. B. Greig and W. M. Findlay (*Aberdeen and No. of Scot. Col. Agr. Bul. 15, pp. 20*).—Each plat used was separated into 2 parts by a fence, one portion being mowed and the other grazed.

A large quantity of Italian rye grass in a seed mixture reduced the hay yield at every farm. No relation appeared between the weight of hay and the proportion of perennial rye grass sown. The absence of red clover reduced the hay crop, but tall oat grass increased it. The plats containing the least rye grass were preferred by cattle. After 2 or 3 years the quantity of pluff and bent grass was found to vary directly with the quantity of rye grass sown.

Practical hay production, A. Nowacki (*Der praktische Kleegrasbau. Berlin, 1909, 4. ed., rev. and enl., pp. VIII+172*).—This volume discusses the value of various clovers, grasses, and seed mixtures for hay growing, and treats in general of the growing, curing, and storing of hay.

Cereal map of Manitoba, Saskatchewan, and Alberta, showing acreage under crop in each township in wheat, oats, barley, and flax, 1909 (*Canada Dept. Int. Wall Map 1*).—Aside from the data for the year 1909 presented graphically, tables show the annual production of wheat, oats, and barley for these provinces each year from 1898 to 1909, inclusive, and of the leading countries of the world during 1909. Statistical data relative to the mills and elevators of the 3 provinces are tabulated.

A new forage crop, M. S. BERTONI (*Bol. Soc. Agr. Mexicana, 34 (1910), No. 33, pp. 650–652; Rev. Agron. y Bol. Estac. Agron. Puerto Bertoni, 4 (1909), No. 1, pp. 7–11*).—The author reports *Andropogon sorghum perennis* n. var., as a new and valuable forage crop. He regards it as "a variety of *Sorghum halepense* and Kafir." The chemical composition is stated.

Composition of some forage beets (*Betterave, 20 (1910), No. 511, p. 258*).—Analyses of 5 samples are given.

Seed corn, C. P. HARTLEY (*U. S. Dept. Agr., Farmers' Bul. 415, pp. 12, figs. 3*).—A discussion of the value of good seed corn is followed by directions for gathering, storing, testing, grading, and shelling corn for seed.

Selecting and storing seed corn, C. P. BULL and L. H. ROBBINS (*Univ. Minn., Dept. Agr., Ext. Bul. 9, pp. 8, figs. 7*).—Directions for selecting and storing seed corn are given.

Cotton selection on the farm by the characters of the stalks, leaves, and bolls, O. F. COOK (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 66, pp. 23*).—This circular discusses, in a popular way for the use of farmers, the essential points to be kept in mind in cotton selection and breeding. Directions are given for the use of progeny rows and the production of seed for sale.

How much nitrogen does green manuring with lupines add to the soil? H. VON FEILITZEN (*Monatsh. Landw., 2 (1909), No. 3, p. 90; abs. in Zentbl. Agr. Chem., 38 (1909), No. 12, pp. 859, 860*).—At Jönköping, Sweden, blue and yellow lupines were sown the middle of May and harvested September 2. The blue lupine reached 125 cm. in height and fully developed its pods, but the yellow was only 100 cm. high and only the lower pods were ripe when harvested. The blue lupine excelled in earliness and yield and was markedly higher in nitrogen content in the portions above ground.

The stubble and roots contained 9.9 per cent and 15.6 per cent of the total dry weight, respectively, in the case of the blue and yellow lupines, and returned to the soil 5 and 10.7 per cent, respectively, of the total weight in nitrogen. These results are presented in columns parallel with those of Strebel (E. S. R., 4, p. 207) and Scholz-Lupitz for comparison. The fresh weight, dry substance, organic substance, and nitrogen of the crop were determined.

The potato as a truck crop, L. C. CORBETT (*U. S. Dept. Agr., Farmers' Bul. 407, pp. 24, figs. 11*).—This discusses the potato as a truck crop and the use of northern grown, southern grown, second crop, and hold-over seed. The preparation of the soil and seed, planting, fertilization, cultivation, spraying, harvesting, grading, and marketing are discussed.

Change of seed and manurial tests, W. ANGUS (*Jour. Dept. Agr. So. Aust., 14 (1910), No. 1, pp. 47–49*).—Newly introduced seed potatoes yielded from 1½ to 2 tons per acre more than local varieties. Tests of superphosphate, potash, nitrate of soda, blood manure, and farmyard manure as fertilizers for potatoes are also reported.

Rice culture, S. A. KNAPP (*U. S. Dept. Agr., Farmers' Bul. 417, pp. 30*).—This bulletin discusses red and commercial varieties of rice, the production and importation of rice, rice soils, irrigation, seed-bed preparation, drainage, methods of sowing, flooding, fertilizing, objectionable grasses, harvesting, thrashing, milling, the effect of fashion in rice, rice as food, rice by-products, rice cultivation in southwestern Louisiana and southeastern Texas, and the prospects for the extension of the rice industry.

Wild rice seed for planting (*Recreation, 32 (1910), No. 3, p. 149*).—Wild rice seed kept moist with a daily change of water during the winter, except when a frozen mass of ice and seed filled the barrel, gave a 75 per cent germination test.

Two new strains of rye, K. VON RÜMKER (*Ztschr. Gesam. Getreidew., 1 (1909), No. 1, pp. 2–7; abs. in Zentbl. Agr. Chem., 38 (1909), No. 11, pp. 759–761*).—Both the varieties discussed produced 6 or 7 per cent more flour than the usual 65 per cent average. The yields were 8 and 7.75 double centners per morgen (46.6 and 45.1 bu. per acre), respectively, from plantings of yellow and blue kerneled rye at the rate of from 13 to 15 kg. per morgen (3 to 3⅜ pks. per acre). Kernel color is not an indication of a mixed or hybrid race but a useful character of a pure race, the writer holds. Yellow kerneled samples grew slightly higher in protein, fat, and ash than the blue-kerneled on analysis of the dry substance.

The production of cigar-leaf tobacco in Pennsylvania, W. FREAR and E. K. HIBSHMAN (*U. S. Dept. Agr., Farmers' Bul. 416, pp. 24, figs. 9*).—A discussion of the varieties and character of cigar-leaf tobacco, grown in Pennsylvania, is followed by an outline of the processes of cultivation, harvesting, curing, and handling. The diseases and enemies of tobacco and its cost of production are also dealt with.

Experiments in turnip culture, A. CARLIER (*Belg. Hort. et Agr., 22 (1910), No. 15, p. 235*).—Each plat in this experiment received a mixture of 400 kg. superphosphate, 800 kg. kainit, and 50 kg. sulphate of ammonia per hectare (356, 712, and 44.5 lbs. per acre, respectively). In addition one series received 200 kg. nitrate of soda at one application, and the other series half that amount when the turnips were from 6 to 7 cm. high and the other half when they were about 15 cm. high. The average yields from the 2 series were 10,725 and 12,442 kg. of roots per hectare, respectively.

The relative amounts of dry matter in several varieties of Swedish turnips; a comparison between the results obtained in the North of England and other parts of Great Britain, S. H. COLLINS (*Proc. Univ. Durham Phil. Soc., 3 (1909–10), No. 5, pp. 303–306*).—This article gives the percentage of total dry matter and the order of merit of each of a number of varieties of swedes tested in the North of England, Great Britain, and elsewhere. The order of merit varied little with the locality.

The development of the grain of wheat, Miss W. E. BRENCHLEY and A. D. HALL (*Jour. Agr. Sci., 3 (1909), No. 2, pp. 195–217, pl. 1, figs. 20*).—The authors recognize 3 stages in the formation of the wheat grain: (a) A period during which the pericarp is the prominent feature, (b) one during which the endosperm is being filled, and (c) the period of ripening or desiccation of the grain. "Each plant possesses, as it were, a special mold," the product of which is uniform in content of nitrogenous and nonnitrogenous materials and ash.

Desiccation rather than chemical changes characterizes the ripening process. A day or two before the farmer regards the grain as ripe it has attained its maximum dry weight of grain.

Tables state the green and dry weights per thousand grains, the specific gravity, and the chemical composition of wheats grown experimentally at Rothamsted.

Correlation in wheat, C. DENEUMOSTIER (*Ann. Gembloux, 20 (1910), No. 5, pp. 274–288, dgms. 3*).—The investigations reported in this article do not verify the law enunciated by von Liebenberg (E. S. R., 6, p. 633). Data on the stiff, white-strawed Hybrid of Massy showed direct correlation between length of culm and weight of ear, length and weight of culm, and indirect correlation between density of culm and length of head. Tables show the length and weight of culms and ears and the density, number of grains, and total weight of grains and number of spikelets per ear for each of a number of hybrids tested.

Wheat—Variety tests, N. Schmitz (*Maryland Sta. Bul. 147, pp. 33–40*).—Earlier variety tests have already been noted (E. S. R., 11, p. 440).

The tests here reported were made on poorly drained clay loam fertilized with 400 lbs. per acre of a 9–2–5 fertilizer. Fultz was used as the standard for comparison of varieties and as a check against soil variations. During 8 years of the period 1899–1907, Currell Prolific, Dietz, and New Shanghai averaged 33.6, 31, and 30.7 bu. per acre respectively. In a test of 39 varieties only Bearded Purple Straw, Dietz Longberry, and China averaged more than 30 bu. per acre for the period 1908–1910.

Roumanian wheat.—Harvests of 1900–1908, A. Zaharia (*Le Blé Roumain.—Récoltes des Années 1900–1908. Bucharest, 1910, pp. 581, maps 10*).—Tables present data with regard to the wheat harvested by each of a large number of farmers, including the area devoted to wheat, the average returns per acre, the weight per hectoliter and per thousand grains, and the chemical composition.

HORTICULTURE.

Frost fighting, A. B. Wollaber (*Mo. Weather Rev., 38 (1910), No. 7, pp. 1106, 1107*).—This is an abstract of a paper by A. G. McAdie describing the method of frost protection by means of small fires or heaters developed in California and now followed elsewhere, the essential features of which are (1) accurate advance information of the likelihood of frost, (2) application of preventive means during critical hours, and (3) guarding the fruit from a too rapid warming.

"In all the devices now on the market attention has been given simply to the heating. Fuel of different kinds is used and for various crops there will be a difference in efficiency, depending upon the fuel used, cost of labor, etc.

"It seems to the writer that all protective devices are based upon the three following principles: (1) Heating, (2) covering, (3) ventilating. Under the first, come all forms of fire baskets, oil pots, and orchard heaters. Under the second, cloth covers, lattice work, artificial cloud builders, smudge makers, and the new anti-frost cover. Under the third head there should be devised suitable forms of blowers and air mixers."

Frost fighting in the Boise Valley, E. L. Wells (*Mo. Weather Rev., 38 (1910), No. 7, pp. 1120, 1121*).—Trials in an orchard near Boise of fire pots burning oil are reported, the results indicating that "orchard heating in the Boise Valley is entirely practicable, and by its intelligent use serious loss from frost can be practically eliminated."

Modern ideas over the reciprocal influence of stock and scion, A. Bencke (*Gartenwelt, 14 (1910), No. 23, pp. 269–272*).—A review of recent experimental knowledge relative to the mutual relation between stock and scion.

Report of the Geisenheim Experiment Station for Pomology, Viticulture, and Gardening for 1909, J. Wortmann et al. (*Ber. K. Lehranst. Wein, Obst u. Gartenbau Geisenheim, 1909, pp. 264, figs. 49*).—This report includes a general review for the year of the instruction work in the Geisenheim Institute and of the activities of the divisions of plant physiology, plant pathology, biochemistry, pure yeast culture, meteorology, and forest diseases, together with a report of the Geisenheim-Eibingen grape propagating station.

Agricultural experiment, H. H. Cousins (*Ann. Rpt. Dept. Agr. [Jamaica], 1910, pp. 6–9*).—This consists of an outline report of cultural experiments in Jamaica with sugar cane, coffee, bananas, citrus, mangoes, cocoa, cassava, tobacco, vanilla, and coconuts including reports on the growth of Para rubber planted in different parts of Jamaica in 1906.

Experiments on the gases given off by bananas and oranges respectively were also carried on in the laboratory. It was shown that oranges gave off a good deal of carbonic-acid gas when stored in a close place such as a ship's hold, but although this gas appeared to be a good preservative of bananas, it was found by direct trial that the emanations from oranges stored in a chamber brought about a premature ripening of bananas. As a result it is recommended that citrus fruits and bananas be placed in separate storage when being shipped for long distances by sea.

In the light of the results secured with the Para rubber tree, it is concluded that it is not suitable for cultivation in Jamaica as a commercial source of rubber. The high cost of labor is one of the important factors against its culture. *Castilloa elastica* appears to be the most promising rubber tree at present being tested in Jamaica. It has a more vigorous growth and capacity for giving its latex at a few tappings, thereby reducing the cost of collecting the rubber.

Mushrooms, R. L. Castle (*London, [1910], 1. ed., pp. VI+20+XII, figs. 28*).—This booklet contains popular directions for growing mushrooms.

Growing tomatoes for the canning factory, J. Troop, C. G. Woodbury, and J. G. Boyle (*Indiana Sta. Bul. 144, pp. 511–528, figs. 8*).—Under the general headings of soil, growing the plants, harvesting, yields and profits, varieties, insects, and diseases, this bulletin discusses the methods now employed in Indiana in growing tomatoes as a field crop for the canning factory, the business being considered from the standpoint of the general farmer. The subject matter is based upon field investigations conducted by the station, observations made in important growing sections, and information furnished by canners and growers.

The investigations as a whole have led to the following suggestions for placing the industry on a better paying basis: The growing and setting out of better plants; more thorough soil preparation, including drainage, fertilizing and cultivation; handling the vines more carefully during the picking season; and planting smaller areas with more intensive methods of culture.

Commercial fruit growing, A. Janson (*Der Grossobstbau. Berlin, 1909, pp. VI+313, figs. 132*).—This work is presented as a guide and text-book of orchard management, including intercropping with small fruits and vegetables. It is especially designed for those who already have a technical knowledge of fruit culture and wish to engage in commercial orcharding. For this reason questions relating to locating the orchard, orchard policy, valuation, financing, determination of yields, etc., are given more importance than cultural details, although many phases of the cultural work are treated with a view to supplementing information furnished in previous works on fruit growing.

Fruit production in the Department of Rhone, Deville (*Ann. Soc. Agr. Sci. et Indus. Lyon, 1909, pp. 101–123*).—In addition to a brief survey of the fruit industry of Rhone, the questions of fertilizing, training, pruning, and thinning fruit trees are discussed, as well as the control of insects and fungus diseases attacking various kinds of fruits.

Fruit growing in Auvergne, D. Layé (*Assoc. Franç. Avanc. Sci., Compt. Rend., 37 (1908), pp. 1127–1137*).—A general account of the fruit industry in the Department of Puy de Dôme, France.

The planting of fruit trees (*West Indian Bul., 11 (1910), No. 1, pp. 50–55, pls. 3*).—In view of the successful results secured by Bedford and Pickering in planting fruit trees without taking any precautions to prevent the roots from being injured and then ramming the soil tightly around them (E. S. R., 20, p. 1034) experiments were undertaken at several of the stations in the West Indies to determine the effect of this unorthodox method of planting in those countries, and preliminary reports are here given of the planting operations in Dominica, Montserrat, Antigua, and St. Kitts, including the results to date.

Planting operations in Antigua and St. Kitts failed generally on account of drought and will be repeated. The work in Dominica and Montserrat shows a decreased rate of growth for trees carelessly planted over those carefully planted, though it still remains to be determined whether this decrease is permanent.

Orcharding, A. Dickins (*Agr. Ed. [Kans. Agr. Col.], 2 (1910), No. 3, pp. 69, figs. 35*).—This publication contains popular directions for growing orchard and small fruits.

Problems surrounding the shipping of fruit, G. H. Powell (*Better Fruit, 5 (1910), No. 3, pp. 25–31, 74, 75, 76, 77*).—The author discusses the various factors affecting the shipping quality of citrus and deciduous fruits, and indicates the improved methods of handling the fruit previous to and during transportation with a view to preventing mechanical injuries and the development of fruit diseases.

Agricultural cold storage plants, G. Bouvier (*Ann. Soc. Agr. Sci. et Indus. Lyon, 1909, pp. 217–238*).—An address on the establishment and uses of cooperative cold storage plants, based upon storage experiments with fruits and vegetables conducted in the experimental plant of the Condrieu Cooperative Cold Storage Society. The general results secured with specific fruits and vegetables are included.

Handling the apple crop of the Northwest, C. I. Lewis (*Better Fruit, 5 (1910), No. 3, pp. 17–24, figs. 21*).—A discussion of modern practices in picking, grading, packing, and shipping apples.

Results of fertilizer experiments with olives, Zachařewicz (*Bul. Dir. Agr. Com. et Colon. [Tunis], 14 (1910), No. 55, pp. 214–223*).—A summarized account of results secured from fertilizer experiments with olives in southern France.

Physiological investigations of the prune and study of methods for improving the prune industry in Servia, W. Stoykowitch (*Recherches physiologiques sur la prune et étude sur les méthodes à employer pour l'amélioration de l'industrie prunière en Serbie. Thesis, Univ. Nancy, 1910, pp. 228+II, figs. 71*).—This thesis, which was presented to the University of Nancy for the doctor's degree, includes a detailed investigation of prune culture and the preparation of dried prunes in the different producing countries, and a comparison of these methods with the methods actually employed in Servia, including a search for means of improving the prune industry of Servia. In addition the author reports physiological investigations relative to the maturing of prunes and their composition in the various stages of their development, as well as personal investigations of various questions connected with the processes of drying prunes.

Quince culture, F. C. Sears (*Mass. Crop Rpt., 23 (1910), No. 5, pp. 32–40, figs. 2*).—This article contains popular directions for growing quinces. It discusses soils and fertilizers, varieties, selecting trees and planting out, fruit bearing and pruning, insects and fungus pests, picking, marketing, and uses.

Coconut cultivation in the Federated Malay States, L. C. Brown (*Dept. Agr. Fed. Malay States Bul. 11, pp. 10*).—Popular suggestions are given for growing coconuts, the extraction of toddy or sugar from the tree, collecting the produce, manufacture of copra, and protection against pests. An estimate of expenditures and receipts is also given for opening up and bringing into bearing 500 acres of coconuts in the Coast district.

Experiments on the quality of tea, G. D. Hope (*Indian Tea Assoc. [Pamphlet] 2, 1910, pp. 29, charts 11*).—Part 1 of this pamphlet discusses the results of a preliminary inquiry conducted at the Heeleaka Experiment Station relative to the influence which external conditions, such as rainfall, temperature, manurial experiments, etc., exert on the quality of tea leaf. Part 2 describes in detail attempts to follow the loss of essential oil during the process of firing in tea, in order eventually to determine methods by which this loss may be minimized.

Germination and selection experiments with tea seed, C. Bernard (*Bul. Dépt. Agr. Indes Néerland., 1910, No. 40, pp. 11–23, pl. 1*).—This consists of notes on the selection, testing, and germination of tea seed, carried on preliminary to the development through selection of a race of tea better adapted to conditions in Java than the present forms.

The author found that selection by size of seed has little value but that the heaviest seeds produce the most vigorous seedlings. Where seeds were immersed in solutions of different density, those immersed in the heaviest solutions gave the best and most uniform seedlings. The density of the seed was not an index to the rapidity of germination, and the failure to sink in the solution is not always an indication that the seeds will not germinate. More regular and uniform germination was secured when the seeds were planted in the ground with the eye downward than when planted with the eye on top.

A report on raspberry manuring experiments, Brehmer (*Gartenwelt, 14 (1910), No. 2, pp. 15–17, fig. 1*).—In some fertilizer experiments conducted with raspberries for a period of 3 years in the experimental fields of the Altona Industrial School a complete commercial fertilizer with a high content of soluble salts and from which the harmful salts had been removed gave much better results as to yield than either the ordinary commercial fertilizer or stable manure. The use of lime in connection with the various combinations appears to have increased the yield.

Beginning and progress in the development of American grapes, T. V. Munson (*Trans. Kans. State Hort. Soc., 30 (1908–9), pp. 195–204*).—A brief survey of the history and progress of grape culture in the United States.

Viticulture in Auvergne, F. Christophle (*Assoc. Franc. Avanç. Sci., Compt. Rend., 37 (1908), pp. 1151–1161*).—A report on the viticultural industry in the Department of Puy de Dôme, France, relative to its history and extent, climatic conditions, methods of culture, varieties, wine making, and marketing.

Greenhouse cultures, P. Pacottet and J. Dairat (*Cultures de Serres. Paris, 1910, pp. 540, figs. 178*).—This book, which is one of the agricultural series published under the direction of G. Wery, is essentially a treatise on grape culture under glass, although some attention is given to the culture of other fruits.

The successive chapters discuss the general factors involved in greenhouse cultures, greenhouse construction, management, and heating, propagation, planting, pruning, forcing operations, various methods of conserving fruit previous to marketing, packing, transportation, and diseases, insect pests, and other hindrances in the greenhouse. The book concludes with a study of greenhouse varieties of grapes.

Town gardening, B. C. Ravenscroft (*London, 1910, 2. ed., rev. and enl., pp. XII+337*).—A revised and enlarged edition of this handbook of trees, shrubs, and plants suitable for culture in the outdoor garden, window garden, and greenhouse, originally issued in 1882.

Rock and water gardens, F. W. Meyer (*London, 1910, pp. XII+227, pls. 50*).—This work embodies a series of popular articles by the late author which have appeared from time to time in *The Garden*, to which additions have been made by the editor, E. T. Cook, with a view to increasing the usefulness of the work. It contains detailed instructions for making and planting rock and water gardens, including suggestions as to plant material. Chapters on wall and heath gardening are also included.

On the composition of flexible and rigid carnation stems, L. FONDARD and F. GAUTHIÉ (*Compt. Rend. Acad. Sci.* [*Paris*], *151* (*1910*), *No. 8, pp. 502–504*).—Analyses are given showing the chemical composition of both stiff and flexible carnation stems. The content of dry matter, nitrogen, phosphoric acid, and potash was found to be considerably greater in the stiff stems, whereas there was a higher lime content in the flexible stems.

On studying the respective composition of the leaves and stems of each variety analyzed, it was found that although the leaves were much richer in nitrogen, potash, and lime than the stems, they were poorer in phosphoric acid. The authors therefore suggest that with a view to producing an abundance of flowering stems it may be well to pay more attention to the importance of phosphoric acid as a carnation fertilizer.

FORESTRY.

How to know the trees, H. IRVING (*London, New York, and Melbourne, 1910, pp. VI+179, pls. 111*).—This book consists of popular descriptions with illustrations of trees commonly met with in Great Britain.

Trees and shrubs of the British Isles, C. S. COOPER and W. P. WESTELL (*London and New York, 1909, vols. 1, pp. XXXII+LXXXIV+108; 2, pp. VIII+260, pls. 86*).—This work has been prepared as a means for identifying not only the trees and shrubs native to the British Isles but also the more common cultivated trees and shrubs.

Over 550 species are described under the headings of flowers, inflorescence, fruit, foliage, mode of growth, and winter buds. Each plant is arranged under its natural order, the characteristics of which precede each group. The introduction contains considerable general information relative to the habitat, form, structure, beauty, uses, etc., of trees and shrubs. A calendar showing the average dates of flowering in mild latitudes, together with a number of lists of trees and shrubs for certain soils and situations, is given, and several chapters preceding the descriptions discuss injurious and useful insects, galls, fungus pests, and fungicides and insecticides.

[Timber trees of Cuba] (*Mem. Admin. Pres. Repub. Cuba, 1909, insert, quarto 2, facing p. 242*).—A descriptive list is given of 112 timber trees of Cuba showing their common and scientific names, origin, height, range, uses of the timber and other products, and the class, specific weight, and color of the timber, together with coefficients of fracture, elasticity, compression, and flection.

Statistics of Danish forests, C. H. FINCH (*Quart. Jour. Forestry, 4* (*1910*), *No. 4, pp. 300–305, pl. 1*).—A brief statistical report on the forests and forest administration in Denmark.

Beech, oak, and hornbeam high forest in France, A. SMYTHIES (*Quart. Jour. Forestry, 4* (*1910*), *No. 4, pp. 275–293, pls. 6*).—A descriptive account of the Forest of Retz, discussing its situation, area, history, climate, geology and soil, enemies, and the details of its administrative policy.

Shortleaf pine (Pinus echinata) (*U. S. Dept. Agr., Forest Serv. Circ. 182, pp. 4*).—This circular discusses the shortleaf pine (*P. echinata*) relative to the form and size of trees grown in plantations, planting range, soil requirements, uses of the wood, seed bed, nursery and planting operations, and yield of plantations.

Loblolly pine (Pinus tæda) (*U. S. Dept. Agr., Forest Serv. Circ. 183, pp. 4*).—The discussion of this species is quite similar to that noted above for the shortleaf pine (*P. echinata*).

The rubber tree of Tonkin and North Annam (Bleekrodea tonkinensis), P. EBERHARDT and M. DUBARD (*Agr. Prat. Pays Chauds, 10 (1910), Nos. 82, pp. 4–23, figs. 6; 83, pp. 112–131, figs. 10*).—A general report on the Tonkin rubber tree (E. S. R., 21, p. 444), relative to its history, geographic distribution, habitat, biology, morphology, anatomy, latex and rubber, methods of tapping, and commercial value of the product.

Tapping experiments with Teo-Nong (Bleekrodea tonkinensis) rubber trees, J. ROULLET (*Bul. Écon. Indo-Chine, n. ser., 13 (1910), No. 82, pp. 1–11*).—Experiments were conducted to determine the best methods of tapping the Teo-Nong tree discussed above, as well as to study the character of the latex.

The V-shaped cut gave the best returns. Although the rubber is of good quality, the latex has a large resin content, and it is concluded that it will not pay to harvest Teo-Nong latex from the wild trees.

India rubber and gutta-percha, T. SEELIGMANN, G. L. TORRILHON and H. FALCONET (*London, 1910, 2. ed., rev. and enl., pp. XVI+498+32, figs. 145*).—A revised and enlarged second edition of this work (E. S. R., 15, p. 680).

The cultivation and preparation of Para rubber, W. H. JOHNSON (*London, 1909, 2. ed., rev. and enl., pp. XII+178+16, pls. 9, figs. 23*).—The present edition of this work (E. S. R., 17, p. 774) has been rewritten and greatly enlarged to include the latest authentic information on rubber culture in the East, as well as a number of subjects likely to be of interest to those connected with the rubber industry.

Plantation rubber in 1909 and its future, H. BRENIER (*Bul. Écon. Indo-Chine, n. ser., 13 (1910), No. 83, pp. 206–242*).—An economic review of rubber conditions in the various producing countries, based upon the recent literature of rubber production, references to which are included.

Comparing plantation rubber with wild rubber, the author finds that the evidence presented is in favor of the Hevea plantations of the East wherever labor is abundant and rational exploitation is employed. On the other hand, overcapitalization, overplanting, mismanagement, and the failure to recognize proper conditions of soil, climate, and culture are apt to react unfavorably to plantation rubber.

Rubber culture in Mexico, H. J. LUDEWIG (*Tropenpflanzer, 14 (1910), No. 10, pp. 510–521*).—A general and statistical account of the rubber industry in Mexico, including an outline of propagation experiments with Guayule rubber being conducted by E. A. Caffey at the Los Cedros plantation.

Rubber culture in the Malay Peninsula, P. J. S. CRAMER (*Dept. Landb. Suriname Bul. 25, pp. 138, pls. 25, figs. 24*).—This bulletin, which is based upon an investigation tour of the rubber plantations in Colombo and the Federated Malay States, is intended as a popular cultural guide for Suriname planters. It discusses clearing the land, selection of soils, drainage, seed bed and nursery practices, planting operations, catch crops, topping and pruning, diseases and other pests, tapping methods, practices and instruments, transporting and coagulating latex, and preparing rubber for the market.

Report of the state forest administration of Bavaria (*Mitt. Staatsforstverw. Bayerns, 1909, No. 9, pp. 207*).—This is a statistical review of forest operations in Bavaria for the year 1907.

The data given show the extent of forest areas of all kinds at the beginning of 1907, the volume and value of timber sales and the sale of minor products, revenues and expenditures for the year, planting and road building operations, net incomes, forest offenses, and forest fires. The results of felling operations, forest plantings, and other improvements in the forests belonging to communes, institutions, and corporations are included. Summarized statistics are also given for the year 1909, showing the nature, volume, and value of major and minor forest products in the various districts of Bavaria.

A statistical review of the forest administration of the Grand-Duchy of Baden for the year 1908 (*Statis Nachw. Forstverw. Baden, 31 (1908), pp. XXI+145, dgms. 11*).—Part 1 of this review contains general summaries relative to forest areas, grubbing and planting operations, and forest offenses. Part 2 contains detailed statistical information for the crown forests, relative to areas by districts, financial yields, yield in lumber and minor forest products, silvicultural operations, road building, wages, and net returns for the year, with comparative data showing the net returns for the previous 41 years. Part 3 contains statistics relative to yields in major and minor forest products, financial returns, silvicultural operations, road building, etc., for the commune and corporation forests during 1908.

The tables are preceded by an explanatory text.

Report of supervisors' meeting at Missoula, Montana, W. B. GREELEY (*Forestry Quart., 8 (1910), No. 3, pp. 302–325*).—This is a rather full account of the proceedings at the meeting of the supervisors of the Forest Service of this Department, held in Missoula, Mont., in March, 1910. Subjects such as the administration of timber sales and logging operations, reconnaissance and working plans, forest planting, and forest settlements' work and policy are discussed.

Survey methods and costs for a large area, E. WILSON (*Forestry Quart., 8 (1910), No. 3, pp. 287–293*).—The problem before the author was to map and estimate over 1,900 square miles of timber lands at the least expense. He describes in detail the methods employed, including a statement of costs for the past 6 months.

Some suggestions on predicting growth for short periods, J. G. STETSON (*Forestry Quart., 8 (1910), No. 3, pp. 326–331, figs. 2*).—The author briefly considers the plan of procedure for determining the growth of unthinned even-aged stands and uneven-aged stands.

Creosote for preserving gate posts (*Agr. News [Barbados], 9 (1910), No. 220, p. 312*).—Pitch pine gate posts treated with creosote in 1905 under the direction of the Antigua Botanic Station were in perfectly sound condition in 1910. Similar untreated posts were erected in 1909 to serve as a future check on the treated posts. The treatment consisted in pouring creosote into a $\frac{3}{4}$ in. hole bored in the top of the post to a depth of from 15 to 18 in., and into similar holes bored at about 18 in. from the ground level and at an angle of about 70°. The holes have been kept filled with creosote almost continuously since the posts were erected.

DISEASES OF PLANTS.

Diseases of cultivated plants and trees, G. MASSEE (*New York and London, 1910, pp. XII+602, figs. 171*).—This work is intended to supplant the Text-book of Plant Diseases by the same author, the first edition of which appeared in 1899 (E. S. R., 11, p. 555). The material has been wholly rewritten and greatly extended, many new diseases having made their appearance since the earlier work was completed. The system of treatment has also been changed, the chapters especially devoted to technical descriptions of fungi having been omitted and such descriptions as were found desirable included in the text describing the disease.

In the present work diseases due to causes other than fungi are considered at some length, but naturally those due to parasitic organisms are given most attention. The descriptions are such as would enable one readily to identify the diseases, and the suggestions for combating them are those that recent investigations have shown to be the most successful.

The grouping of the diseases is essentially the same as in the previous work and is in the sequence of the orders of fungi and not by host plants.

Control of diseases of fruits, vegetables, and flowers, H. C. THOMPSON (*Mississippi Sta. Bul. 141, pp. 3–30, figs. 21*).—Brief descriptions are given of some of the principal diseases affecting fruits, vegetables, and flowers, together with directions for their control, including the preparation and application of the common fungicides and insecticides, types of sprayers, and remedies other than sprays that should be used.

Report on some plant diseases, F. BUBÁK (*Ztschr. Landw. Versuchsw. Osterr., 18 (1910), No. 4, pp. 502–505*).—In a report of the work done during 1909 by the station for plant diseases of the Royal Agricultural Academy in Tabor (Bohemia), the more important fungus diseases and insect pests examined or studied are given, including a new grape fungus (*Fusicoccum bulgaricum*). Experiments with *Ustilago sorghi* and *U. bulgarica* (E. S. R., 23, p. 250) on *Sorghum vulgare* showed that the characteristics of the new fungus (*U. bulgarica*) are constant and that it is capable of infecting the young seedlings like *U. sorghi*.

Notes on some plant diseases, T. H. JOHNSTON (*Agr. Gaz. N. S. Wales, 21 (1910), No. 7, pp. 563–566, pls. 2*).—Attention is called to the presence of late blight (*Phytophthora infestans*) on tomatoes and the relationship of this disease to potato and tomato crops. Of potato diseases, both late blight and leaf spot (*Alternaria solani*) are fairly common, while the honey fungus (*Armillaria mellea*) was found in potato tubers.

The commonest apple scab is *Fusicladium dendriticum*, but another scab is also described due to the fungus *Coniothecium chromatosporum*. Spraying with Bordeaux mixture controlled the common scab (*F. dendriticum*), but not the other one.

Fungi exotici, XI, G. MASSEE (*Roy. Bot. Gard. Kew, Bul. Misc. Inform., 1910, No. 7, pp. 249–253, pls. 2*).—Twelve new species of fungi are described. Two of these are of special interest, *Nectria theobromicola* from West Africa, parasitic on the pods of *Theobroma cacao*, and *Eutypa caulivora* from Malay, parasitic on the wood of *Hevea brasiliensis*. A popular description of the latter has been previously noted (E. S. R., 23, p. 750).

Cultures of parasitic Hysteriaceæ, K. VON TUBEUF (*Naturw. Ztschr. Forst u. Landw., 8 (1910), No. 8, pp. 408–411, fig. 1*).—The author gives the results of cultures of leaf cast fungi, such as *Lophodermium pinastri*, on gelatin, broth, and other artificial culture media.

On the synonomy of the genus Nectria, F. VON HÖHNEL and J. WEESE (*Ann. Mycol., 8 (1910), No. 4, pp. 464–468*).—The results are given of a study of material of this group found in the herbaria at Berlin, Kew, and Paris, and the Rehm herbarium at Munich.

The smuts of Australia, D. MCALPINE (*Melbourne: Dept. Agr. Victoria, 1910, pp. 288, pls. 57, figs. 16*).—The object of the present work is to classify and describe all known species of Australian smuts, to supply photomicrographs of their spores and other important features so as to determine their identity, and to give an account of their life histories as far as present knowledge goes, in order that a rational mode of treatment may be adopted for preventing their ravages in cultivated crops.

The general plan of the work is along the same lines as that of The Rusts of Australia (E. S. R., 18, p. 149), and is divided into 5 subdivisions as follows: (1) General characters, including vegetative and reproductive organs (spores, conidia, etc.), spore formation in Australian genera, germination of spores, infection, parasitism and immunity, relations between host and parasite in smut diseases, indigenous and introduced species; (2) life histories and treatment of cereal smuts, viz, wheat bunt (*Tilletia tritici*), loose smut of wheat (*Ustilago tritici*), flag smut of wheat (*Urocystis tritici*), loose smut of oats (*Ustilago avenæ*), naked smut of barley (*U. nuda*), covered smut of barley (*U. hordei*), and head smut of maize (*Sorosporium reilianum*); (3) life histories of various grass smuts, including grain smut of sorghum (*Cintractia sorghi-vulgaris*), brome grass smut (*U. bromivora*), kangaroo grass smuts (three), and Wallaby grass smuts (two); (4) field experiments during 1909; and (5) classification and technical descriptions of 11 genera and 60 species.

An extensive bibliography is appended.

Facts contributing to the explanation of grain rust epidemics, E. C. JOHNSON (*Abs. in Science, n. ser., 32 (1910), No. 816, p. 256*).—The author states that wintering uredospores and wind-blown uredospores or æcidiospores are usually present in sufficient quantities to start rusts every year. The germination of uredospores and the infection in many rusts takes place most easily at the relatively low temperatures of 60 to 70° F.

Wheat is said to be particularly susceptible to infection at heading time, and if this period is delayed by a late season, or is unduly lengthened by reason of low temperatures, the number of spores falling on each plant is proportionately increased, and the rust is given unusual chances for development. Subnormal temperatures, especially cool nights with heavy dews, are exceedingly favorable to rust infection at this time, being far more so than excessive rainfall due to sudden showers with periods of high temperatures between.

An analysis of the climatological conditions over the middle Northwest showed that the most severe epidemics of rust appeared when the temperatures averaged 3.5° subnormal over this region.

On the outbreak of the leaf-roll disease in Wurttemberg, W. LANG (*Württemb. Wchnbl. Landw., 1909, Nos. 23, pp. 420–422; 24, pp. 444, 445*).—The author discusses the symptoms, causes, and remedies for this disease.

It is stated that the tubers do not always show indications of the disease, but that the rolling and coloring of the tops is one of the most marked symptoms, although this may be caused by other diseases.

The disease is said to be prevalent in Wurttemberg, and has materially decreased the yield. The cause of the disease is not yet known, but regional conditions seem to be an important factor in its outbreaks.

The selection and breeding of highly resistant varieties is recommended as the best means of control.

New studies on the leaf-roll disease of the potato, R. SCHANDER (*Jahresber. Ver. Angew. Bot., 7 (1909), pp. 235–245*).—From these studies, the author concludes that the leaf-roll disease can be transmitted by means of infected seed tubers, and that the coloring of the fibro-vascular bundles is not a certain indication of the disease. The treatment of the seed potatoes with various fungicides produced no effect in controlling the disease, and the use of different kinds of fertilizers was also without effect. The use of sound tubers only as seed is recommended.

Irish potato blight, D. MCALPINE (*Dept. Agr. Victoria Bul. 27, pp. 5–42, pls. 16, figs. 5; Dept Agr. So. Aust. Bul. 49, pp. 42, pls. 16, figs. 5*).—On account of the late blight (*Phytophthora infestans*) having been discovered in all the states of Australia, the author deems it wise to discuss the life history and damage done by this disease, so that all potato growers will be able to recognize it and take the proper precautions against it. A history of the disease, its occurrence in New Zealand and Australia, its symptoms, cause, development, favoring conditions, and methods of combating it are given.

Spraying experiments at West Maitland for the prevention of potato blight, W. J. Allen (*Agr. Gaz. N. S. Wales, 21 (1910), No. 7, pp. 571–576, figs. 6*).—The usual beneficial results are reported for spraying with Bordeaux mixture in controlling the late blight (*Phytophthora infestans*) even when the applications were delayed till after the fungus had appeared. No appreciable differences were observed between the results obtained from the use of Bordeaux mixture and copper soda spray.

A disease of rhubarb (Peronospora jaapiana), P. Magnus (*Ber. Deut. Bot. Gesell., 28 (1910), No. 6, pp. 250–253*).—The author describes a new leaf-spot disease of rhubarb (*Rheum rhaponticum*) under the name of *P. jaapiana* n. sp.

Studies on the fungi of rice in Japan, I. Miyake (*Jour. Col. Agr. Imp. Univ. Tokyo, 2 (1910), No. 4, pp. 237–276, pls. 2*).—This has been previously noted from another source (E. S. R., 23, p. 347).

On tumor formation in sugar beets, K. Spisar (*Ztschr. Zuckerindus. Böhmen, 34 (1910), No. 11, pp. 629–634, figs. 4*).—A general description of the characteristics of this disease is given, together with an anatomical study of the structure of the tumors. It is claimed that the disease is caused by a mechanical injury to the root system of the beets.

On the premature seeding in sugar beets, Neumann (*Deut. Landw. Presse, 37 (1910), No. 25, pp. 279, 280*).—The author states that during May, 1909, there were 5 late frosts while for the same month in 1908 there was none, and that the May of 1909 was very hot and dry while in 1908 this month's rainfall was normal. These unfavorable weather conditions during the May of 1909 seemed to be the cause of the unusually large amount of premature seeding of sugar beets.

The diseases of sugar cane, C. W. Edgerton (*Federal Reporter, 11 (1910), No. 9, pp. 11–13; La. Planter, 44 (1910), No. 24, pp. 484, 485*).—A paper read before the Louisiana Sugar Planters' Association, summarizing Bulletin 120 of the Louisiana stations previously noted (E. S. R., 23, p. 648).

A new disease of sulla, L. Montemartini (*Riv. Patol. Veg., 4 (1910), No. 11, pp. 165–167*).—A description is given of a leaf spot disease of sulla due to *Anthostomella sullæ* n. sp. This fungus produces on the upper surface of the leaves large dark spots, which gradually extend to the middle of the leaf, causing it to curl and wither up.

Wheat smuts and scab, N. Schmitz (*Maryland Sta. Bul. 147, pp. 40–45*).—Descriptions are given of the loose and stinking smuts of wheat, and of wheat scab, together with directions for their control.

The dying of fruit trees and the leaf-roll disease of the potato, K. Störmer (*Jahresber. Ver. Angew. Bot., 7 (1909), pp. 119–170, pl. 1, figs. 15*).—In a further discussion (E. S. R., 23, p. 350) of the general symptoms, causes, etc., of the peculiar dying of fruit trees in certain sections of Europe, the author compares the symptoms of the diseased species (cherry, apple, and currant) with the characteristics of the leaf-roll disease of the potato.

He concludes that as the external symptoms are similar and the disease begins in each cases in the roots, the primary cause must be unfavorable soil conditions (such as too much acid, alkali, or water, a deficiency in the food or water supply, or a poor physical condition of the soil) which weakens the vitality of the plants, thereby permitting the entrance of parasites, such as *Botrytis ribis* for the currant, *Valsa leucostoma* for the cherry, a similar fungus for the apple, and a Fusarium, *Verticillium albo-atrum*, etc., for the potato, which finally cause the death of the plants. The removal of these unfavorable soil conditions by proper cultivation, rotation of crops, drainage, and fertilizers, and the control of the fungi by disinfection of the soil with carbon bisulphid, etc., are recommended.

Bitter pit, C. P. Lounsbury (*Agr. Jour. Cape Good Hope, 37 (1910), No. 2, pp. 150–173, figs. 3, pl. 1*).—A general discussion is given of the characteristics, cause, occurrence in Africa and other countries, importance, development in storage, variety of apples affected, and methods of control, of the bitter pit of the apple.

It is claimed that the disease is not due to insects, fungi, or bacteria, but seems to be a physiological one accentuated by certain climatic conditions that prevail in parts of South Africa. It is stated that not only does the fruit on the trees show the spots, but fruit apparently healthy when gathered also develops the bitter pit in storage after 10 to 20 days.

Certain varieties of apples pit very badly while others, especially those grown from Colonial seedlings, are practically immune to the disease, and by careful selection of the more resistant varieties the disease may be partially controlled.

A disease of young apricot fruits, W. H. Nixon and H. W. Curry (*Pacific Rural Press, 80 (1910), No. 7, p. 124*).—Attention is called to a new rot which of late years has caused considerable damage to the apricot crops in the Santa Clara Valley, California.

The disease begins at the base of the young fruits before the calyx and stamens fall, and after a rain not followed by hot or windy weather which would serve to dry up the water held between the calyx and the fruit. It first appears as a firm brownish rot, which later forms cottony tufts of mycelium on the surface, followed by white crystals scattered over these tufts. Finally the diseased area turns black and hardens, and the entire fruit shrivels and mummifies as in brown rot.

This disease under favorable weather conditions destroys from one-fourth to one-half of the crop. The fungus is believed to be *Botrytis cinerea*, and in a similar disease from San Jose is associated with another fungus which in cultures produces no spores but forms solid, black, oval sclerotia about one-half in. long.

The development of Gnomonia erythrostoma, F. T. Brooks (*Ann. Bot. [London], 24 (1910), No. 95, pp. 585–605, pls. 2*).—An account is given of some of the phases in the life history of this fungus, which is held to be the cause of the cherry leaf scorch disease.

Coconut palm disease, H. N. Ridley (*Agr. Bul. Straits and Fed. Malay States, 9 (1910), No. 5, pp. 178–180*).—Attention is called to a serious disease of coconuts in Borneo, the author believing it to be identical with that described by Butler (E. S. R., 20, p. 454). The disease is said to be due to a species of Botryodiplodia which attacks the roots, cutting off the water supply so that the buds die of drought and starvation. In addition to coconuts, betel and caryota palms are subject to attacks of the fungus.

Cottony mold of lemons, C. O. Smith (*Cal. Cult., 35 (1910), No. 9, pp. 196, 197, figs. 2*).—The results of a study of the cottony mold of lemons are given, in which the cause of the disease, life history of the fungus (*Sclerotinia* sp.), relation between a cover crop and cottony mold, laboratory experiments with the fungus, and control measures are discussed.

This disease has been on the increase in recent years and often causes heavy losses among lemons during the curing process by producing a soft rot of the fruit while in storage. The primary infection of the fruit occurs from spores produced in the orchard, which in the packing house develop only the sterile mycelium of the fungus in the form of a dense widely spreading white cottony mold-like growth that quickly spreads from their original centers of infection to the surrounding green fruit in the boxes.

The life history of the fungus consists of three stages, the packing-house vegetation stage of white cotton-like growth, which finally penetrates to the interior of the lemons and produces black sclerotia, and the ascospore stage which is developed from the sclerotia. These spores on germination may infect either the cover crop or the green lemons through the button end through some abrasion on the fruit. The cottony mycelium thus produced is capable of infecting perfectly healthy lemons.

It is stated that the disease has increased with the increased growing of cover crops, especially vetch, as the dense growth of this legume affords a suitable place for the development of the fungus, which also occurs as a saprophyte. Under the vetch the sclerotia are produced in great numbers on any dead or dying vegetable matter, and on the advent of the winter rains develop the spore stage. It is also claimed that the fungus is actively parasitic on the twigs and branches of both lemon and orange trees, where sclerotia are produced with spores capable of infecting the green lemons, but that by far the worst and most common method of infection is from the clover crop.

It is suggested that the most logical method of combating this disease is in the washing tank by using some strong disinfectant, such as copper sulphate, but that further experiments are necessary before an exact formula can be given.

Bloom blight of mango in Cuba, P. P. CARDIN (*Cuba Rev., 8 (1910), No. 5, pp. 28, 29, fig. 1*).—Attention is called to the prevalence of this disease (*Glœosporium mangiferæ*) in Cuba, which causes the opening blossoms of infected trees to turn black, rot, dry up, and fall off, this being followed by the withering and death of the central stem. Insects which visit the flowers carry the spores of the fungus from flower to flower, thus spreading the disease. Two thorough applications of Bordeaux mixture at intervals of 2 weeks are recommended as a remedy.

A new disease of the olive, L. MONTEMARTINI (*Riv. Patol. Veg., 4 (1910), No. 11, pp. 161–164*).—The author describes a disease of olives which first causes the extremities of the foliage to wither. As the disease advances, the interior of the branches are invaded until finally the tree dies.

On removing the bark of an attacked branch, the cambium zone shows a brown color, which becomes more intense as the disease progresses, and finally, especially in young plants, becomes putrid and watery, thus preventing the movement of the sap. Associated with the diseased areas was found an abundance of a large bacterium which is supposed to be the cause of the disease, and which will be described in detail in a later paper. The disease begins apparently in the very young branches, and spreads from these to the larger and older parts.

The Phytophthora rot of pears in Bohemia, F. BUBÁK (*Ztschr. Pflanzenkrank., 20 (1910), No. 5, pp. 257–261, pl. 1, figs. 2*).—The author describes the characteristics, mycelium, and fructifications (conidia and oospores) of this fungus (*P. cactorum*) as found in the ripe or ripening fruit of pears. The mycelial threads are nonseptate, and usually without haustoria, the usual characters of the mycelium for this fungus when it is living saprophytically.

A disease of the grape, J. V. SOLANO (*Bol. Dir. Fomento [Peru], 8 (1910), No. 5, pp. 1, 2, pl. 1*).—A disease of the grape which causes large tumors or excrescences on the stems is reported from the Moquegua Valley as doing great damage. The direct cause of this disease is not known, but it is supposed to be of a bacterial nature and is apparently worse after a winter of low temperature.

Cutting out the diseased areas, washing the wounds with a solution of sulphate of iron (50 kg. sulphate of iron, 1 liter sulphuric acid, and 100 liters water), and then covering them with tar or clay, is the remedy recommended.

A vine disease of lower Austria, L. LINSBAUER (*Jahresber. Ver. Angew. Bot., 7 (1909), pp. 112–118, figs. 3*).—A general discussion is given of the characteristics and probable causes of a disease of the grape, in which the main and constant distinctive feature is a stiff, upright position of the shoots in place of the usual flexible drooping growth. Accompanying this are several other more or less constant characteristics, such as the failure of the blooms to set fruit, a dwarfed growth of the stocks, leaves with yellowish pocket-like spots, or with brown, brittle dead spots, or an affection of the entire leaf in this manner, abnormally short upper internodes with the leaves small and thickly clustered, a strong growth of young shoots from the axillary buds, a repeated branching of the shoots, and the formation of gall-like excrescences on the stocks while no leaves or only curled ones are present. An examination of the inflorescence on diseased plants showed that in place of perfect flowers there were many staminate and so-called intermediate flowers present.

The disease seems to be due to climatic conditions, such as wet summers and hot dry autumns, followed by dry, moderately cold, but prolonged winters.

Grape-spraying experiments in Michigan in 1909, L. A. HAWKINS (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 65, pp. 15, pls. 3*).—This is a report on spraying experiments conducted in the same general way as in previous years (E. S. R., 22, pp. 50, 247), in which the comparative value in controlling the black rot (*Guignardia bidwellii*) was tested for the following sprays: (1) Bordeaux mixtures, 4:4:50, 4:3:50, 4:2:50, and 3:2:50; (2) neutral copper acetate, 1:50; (3) ammoniacal copper carbonate, 6:3:50; (4) self-boiled lime sulphur, 10:10:50; and (5) commercial lime-sulphur solution, 1:75. Resin-fish-oil soap and iron sulphate were also added to the 4:3:50 Bordeaux mixture as adhesives in some of the trials.

Although the season was a favorable one for the black rot it was demonstrated that the disease can be controlled by proper methods of spraying and cultivation, even in such seasons. In vineyards where the fungus had been thoroughly established and very destructive, there was a difference of 86.4 per cent between the amount of rot on the unsprayed check and the best sprayed plat, while in the vineyards which had been thoroughly sprayed the previous year, practically no loss occurred from black rot on the portions sprayed with Bordeaux mixture; on the check plat, however, the loss was 39.8 per cent.

The best fungicide used was 4:3:50 Bordeaux mixture. The 3:2:50 Bordeaux mixture may prove as efficient, but should be tested more thoroughly. Of the two nonstaining compounds, neutral copper acetate and ammoniacal copper carbonate, the former proved to be the better fungicide, but seriously injured the foliage when used throughout the season, although it seemed to have no ill effects when used only as a final application. The two lime-sulphur compounds used proved unsuitable as fungicides for grapes, as neither controlled the rot as well as the Bordeaux mixture, while the commercial lime-sulphur spray was very injurious to the vines. The resin-fish-oil soap proved to be a better sticker than the iron sulphate, and when used in the last application at the rate of 2 lbs. soap to 50 gal. of the mixture, seemed to be as effective as when used in all the sprayings.

It is concluded that the disease can be controlled with 5 thorough applications of 4:3:50 Bordeaux mixture, soap being used in the final application.

The fight against the grape mildew, A. CADORET (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 31 (1910), No. 31, pp. 137, 138*).—The author claims that during the past 6 years an outbreak of the grape mildew has always been preceded from 13 to 15 days by attacks of mildew (*Glœosporium nervisequum*) on the sycamore. If the sycamores suffer from only one attack, the grapes may or may not have the grape mildew, but if the sycamores have two attacks an outbreak of grape mildew is certain. When the sycamores have three successive invasions, the grapes are sure to suffer from a general epidemic. As a result of these observations, it is recommended that the grapevines be sprayed as many times as the sycamores have the mildew, this to be followed by dusting with sulphur and copper sulphate.

Experiments on the control of the grape Peronospora, A. WEINBAU (*Landw. Jahrb. Schweiz, 24 (1910), No. 4, pp. 326–328*).—The results are given of experiments with 2, 1½, and 1 per cent Bordeaux mixtures, Tenax 1 and 2 per cent solutions, Reflorit, salt water, carbolineum, and Cucasa in combating the downy mildew of the grape.

Four sprayings with the Bordeaux mixtures at intervals of from 10 to 17 days gave satisfactory results. The 2 per cent Tenax solution was only moderately satisfactory, while Reflorit, salt water, and carbolineum gave unsatisfactory results in controlling the mildew. The value of Cucasa in combating this disease can not be definitely determined without further experiments.

On the treatment of grape mildew, A. GERVIÈS (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 31 (1910), No. 35, pp. 256–258*).—It is claimed that by alternately spraying with copper sulphate solutions and dusting with a mixture composed of powdered copper sulphate and sulphur, the mildew can be successfully controlled. Directions are given as to dates of application, sequence of treatment, etc.

On the efficiency of copper salts in combating the mildew, S. ANDRÉ (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 31 (1910), No. 33, pp. 198–200*).—The author gives in tabulated form the number and variety of vines treated, the dates of treatments with both liquid (neutral acetate of copper) and powdered copper salts, the solutions used, and the results obtained in controlling the mildew on the foliage and the fruit.

It was found that the mildew was practically controlled when the salts of copper were applied at the right time and a sufficient number of treatments were given.

The acetates of copper, A. DEJEANNE (*Rev. Vit., 33 (1910), No. 863, pp. 701–707*).—This is a discussion of the relative efficiency of neutral and basic acetates of copper as fungicides in combating diseases of the grape, especially with reference to their adhesion to the leaves.

The formulas for the preparation of acetate sprays as recommended by various writers are given.

New formula of silver nitrate for combating the grape mildew, V. VERMOREL and E. DANTONY (*Prof. Agr. et Vit. (Ed. l'Est-Centre), 31 (1910), No. 32, pp. 168, 169; abs. in Bul. Soc. Agr. France, 1910, Aug. 15, pp. 162–164; Weinbau u. Weinhandel, 28 (1910), No. 33, p. 327*).—In a previous note (E. S. R., 23, p. 746) a general formula was given for preparing this spray. In this paper more specific directions are given as to the amount of soap to be used.

For distilled or pure rain water, 150 gm. soap, 20 gm. nitrate of silver, and 100 liters water are sufficient. For water having a hydrometer test of 15°, 300 gm. soap should be used, for 20°, 350 gm., etc., or 10 gm. soap for every hydrometer degree.

This spray can be applied with the ordinary sprayers used for Bordeaux mixture, lime sulphur, etc., and the time and number of applications are the same as for the copper sprays.

Concerning the new formula for silver salts, L. DEGRULLY (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 31 (1910), No. 33, pp. 191, 192*).—It is suggested that the formula proposed above be modified as follows: Dissolve from 15 to 20 gm. of nitrate of silver and from 250 to 300 gm. of sulphate of copper in a few liters of water to which a little ammonia has been added; then dissolve from 40 to 50 gm. of pyrogallic acid in 95 liters of water and pour the solution of silver and copper salts into the pyrogallic acid solution. A dark brown precipitate of silver is found which is extremely adherent to the surface of the leaves.

The Fusarium disease of asters, A. OSTERWALDER (*Landw. Jahrb. Schweiz, 24 (1910), No. 4, pp. 247, 248*).—A description is given of a disease of asters which causes the stems during the blossoming period to wither and dry up. Near the ground the stems are dark colored. The disease seems to be due to a Fusarium, probably *F. incarnatum*.

Experiments on tree diseases, E. MÜNCH (*Naturw. Ztschr. Forst u. Landw., 8 (1910), Nos. 8, pp. 389–408, pls. 3; 9, pp. 425–446*).—This is a more extended discussion of tree diseases, especially of those caused by wood-destroying fungi, than the author's earlier paper (E. S. R., 22, p. 152) on the same subject, being supplemented by data drawn from recent experiments in artificial infection of living trees. The author reports and discusses the results of infection experiments with *Schizophyllum commune*, *Stereum purpureum*, *S. hirsutum*, *S. rugosum*, *Polyporus igniarius*, *P. fomentarius*, and *Collybia velutipes*, mainly on 100 to 120 year old beeches, but also on the horse chestnut and poplar.

On the rotting of wood in dwellings by Coniophora cerebella, E. SCHAFFNIT (*Jahresber. Ver. Angew. Bot., 7 (1909), pp. 246–253*).—After a careful examination of the rotting of wood in two dwellings, the conclusion is drawn that the rotting due to *C. cerebella* can not be controlled by attempting to prevent infection, as the spores are continually flying in the air and may therefore infect the wood both before and after it is used in the building.

The subsequent rotting of the wood is due to its high water content, which results either from a lack of proper drying before use, or to subsequent wetting during storage or the process of building. To prevent the danger of rotting, the timber must be thoroughly dried before using, a subsequent wetting during building must be avoided, and smooth wood surfaces should be painted with some disinfecting material, such as tar, carbolineum, etc.

Oxidizing enzyms and their relation to sap stain in lumber, I. W. BAILEY (*Bot. Gaz., 50 (1910), No. 2, pp. 142–147*).—The discoloration of sapwood, or sap stain, is said to involve the loss or the depreciation in value of large quantities of lumber annually. The phenomenon is illustrated by the reddish-yellow or rusty colored sap stains occurring in the sapwood of alder, birch, and cherry, and by the blue colored sap stains in the red gum.

The author has made a study of the causes of this stain, and finds that in general it is produced in two ways, by the attacks of fungi and by chemical discoloration due to the activity of oxidizing enzyms. Hot, humid weather is said to be very favorable to the activity of the ferments, while cold winter weather is unfavorable. The oxidizing enzyms which produce the sap stain are destroyed and their oxidizing action prevented by a temperature of 100° C.

The author believes that treating the sapwood of alder, birch, and cherry, or other species, with boiling water will destroy the oxidizing enzyms in the wood and prevent the stain. In mill practice, this should be done by treating the lumber in tanks of boiling water, and the author believes that this would be a practical method of preventing the discoloration.

Experiments on the influence of root fungi on the thriftiness of chestnuts, H. MÜLLER and O. SCHNEIDER (*Landw. Jahrb. Schweiz, 24 (1910), No. 4, pp. 234, 235*).—As a result of experiments on chestnut seedlings it is claimed that the presence of root fungi (Mycorrhiza), at least during the first years' growth of the seedlings, is of no great value.

A fungus disease on the leaves of Ulmus campestris, G. DOROGIN (*Ztschr. Pflanzenkrank., 20 (1910), No. 5, pp. 261–263, figs. 2*).—A leaf spot disease of the elm due to *Glœosporium inconspicuum campestris* n. var. is described.

The whitening of the mountain cedar (Sabina sabinoides), F. D. HEALD and F. A. WOLF (*Mycologia, 2 (1910), No. 5, pp. 205–212, pl. 1, figs. 3*).—The authors attribute the characteristic white markings of the mountain cedar, as seen throughout portions of Texas, to a fungus which is claimed to be more or less parasitic, as it occurs most abundantly on the young twigs and trees, finally killing the affected branches by surrounding them and corroding the bark until the cambium layer is entirely destroyed.

The fungus is claimed to be new to science, and is described under the name *Cyanospora albicedræ* n. g. and sp., belonging apparently to the Ceratostomaceæ, and closely related to the genus Ophioceras.

Parasitic root diseases of the Juncaceæ, E. J. SCHWARTZ (*Ann. Bot. [London], 24 (1910), No. 95, pp. 511–522, pl. 1*).—A study was made of the tubercles or other swellings which are frequently found on the roots of various species of Juncus and Cyperus, a preliminary account of which has been given elsewhere (E. S. R., 23, p. 50).

The author found that the roots of some of the species of Juncus are subject to the attack of two distinct parasites, *Sorosphæra junci* and *Entorhiza cypericola*. The life history of *S. junci* corresponds very closely to that described for *S. veronicæ*. Infection experiments with Sorosphæra showed that the root hairs are penetrated by the amœba forms, the parasite passing into the roots. When attacked by this organism the roots are not hypertrophied, whereas those attacked by the Entorhiza form tubercles. The infection by the Entorhiza is probably through the root hairs.

In addition to these fungi the author reports that *Juncus bufonius* is sometimes infected by *Tolyposporium junci*, but he is unable to determine whether there is any relation between this fungus and the Entorhiza.

The rouge (leaf cast) of Pinus sylvestris, E. MAIRE (*Rev. Eaux et Forêts, 49 (1910), No. 15, pp. 458–460*).—In this special form of the disease, the needles first turn yellow, then red, dry up, and fall off. From the observations made, the attack seems to be favored by wet weather, and is due to a fungus (*Lophodermium pinastri*), which may be controlled by spraying with copper solutions.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Game laws for 1910, H. OLDYS, C. E. BREWSTER, and F. L. EARNSHAW (*U. S. Dept. Agr., Farmers' Bul. 418, pp. 47*).—"The present bulletin, containing the eleventh annual summary of the game laws of the United States and Canada, has been prepared on the same general plan as those issued each year since 1902. It differs from other publications on the game laws in several important points: (1) Inclusion of a brief but comprehensive review of the measures enacted and also the more important ones which failed, (2) arrangement of provisions by subjects instead of by States, and (3) adoption of a uniform statement and order of the various details to facilitate ready comparison of similar provisions in different States."

Report on rat extermination, D. B. MACKIE (*Philippine Agr. Rev. [English Ed.], 3 (1910), No. 1, pp. 42–45*).—This is a report pertaining to an investigation of rats in southern Luzon and their relation to the rice crop.

Birds and mammals of northwestern Colorado, A. H. FELGER (*Univ. Colo. Studies, 7 (1910), No. 2, pp. 132–146*).—This annotated list of 133 species of birds and 51 mammals includes those observed and collected on an expedition and also those reported on good authority from the region.

Birds of New York, E. H. EATON (*N. Y. State Mus. Mem. 12, pt. 1, pp. 501, pls. 43, figs. 106; rev. in Science, n. ser., 32 (1910), No. 816, pp. 247, 248*).—In the introductory chapters of this work the author gives a summary of the

New York State avifauna, discusses the life zones of the State, the Mt. Marcy region, the increase and decrease of species, bird migration, spring arrivals, published local lists, county schedules, classification, etc. Descriptions are then given of the genera and species of water and game birds known to occur in the State, with accounts of their distribution, migration, haunts and habits, food, etc.

Forty-two colored plates prepared by L. A. Fuertes are included in the work. The review is by J. A. Allen.

Distribution and migration of North American shorebirds, W. W. COOKE (*U. S. Dept. Agr., Biol. Survey Bul. 35, pp. 100, pls. 4*).—Large numbers of the shorebirds which inhabit or pass through the United States in migration are annually killed by hunters. Many species possess considerable economic importance, but it is evident that unless prompt measures are taken adequately to protect them, some of the larger and more important kinds are likely to become extinct, especially in the region east of the Mississippi River. In order that intelligent legislation in their behalf may be enacted, the author has summarized for each species information relating to their breeding range, winter range, migration range, and spring and fall migrations.

Shorebirds are represented in North America by 76 species and 9 subspecies, of which 50 regularly visit the United States during some part of the year. While a few do not migrate at all, most shorebirds migrate more than 1,000 miles each season and many to 7,000 miles. It is stated that many flocks of golden plover fly without resting from Nova Scotia to northern South America, and that 5 species of shorebirds that summer in Alaska are found in the Hawaiian Islands during the winter season.

[Propagation of ruffled grouse, quail, and pheasant in confinement], C. F. HODGE and A. MERRILL (*Rpt. Comrs. Fisheries and Game [Mass.], 1908, pp. 60–81*).—Breeding investigations for the year are reported.

Injurious insects and other animals observed in Ireland during the year, 1909, G. H. CARPENTER (*Econ. Proc. Roy. Dublin Soc., 2 (1910), No. 2, pp. 30, pl. 1, figs. 10*).—Brief accounts of the more important pests of the year are given.

Insects: Their organization, development, habits, and relations to man, A. BERLESE (*Gli Insetti: loro organizzazione, sviluppo, abitudini e rapporti coll' uomo. Milan, 1906–1909, vol. 1, Nos. 1–35, pp. X+1004, pls. 10, figs. 1292*).—This first volume, consisting of 35 fascicles, is devoted to embryology and morphology.

The general anatomy and physiology of insects, C. HOULBERT (*Les Insectes; Anatomie et Physiologie Générales. Paris, 1910, pp. 372+XII, figs. 202*).—An introduction to the study of insect biology.

Importance of entomology in the development of Canada, C. G. HEWITT (*Ottawa: Govt., 1910, pp. 17–54*).—An address delivered December 10, 1909, before the standing committee on agriculture and colonization.

Recent observations upon European insects in America, E. P. FELT (*Jour. Econ. Ent., 3 (1910), No. 4, pp. 340–343*).—*Pissodes notatus*, a very important enemy of pine in Europe, is stated to have been introduced into New York with pine tree seedlings shipped from Oudenbosch, Holland. The European juniper webworm (*Dichromeris marginellus*) appears to have become well established in New York State, material having been received from Tarrytown and Plandome. A cocoon of *Saturnia pavonia* is reported to have been found on nursery stock at Rochester N. Y. A European box leaf midge (*Monarthropalpus buxi*) was found in May, 1910, infesting a box hedge (*Buxus sempervirens*) at Kingston, R. I. *Chermes piceæ* which has been recorded as very destructive to young silver firs, comparatively young specimens of *Abies nordmanniana*, and even fairly old trees of *A. nobilis*, was found infesting Nordmann's firs received from Europe. Mention is also made of the introduction of *Hyponomeuta malinella* into New York on apple seedlings.

Some insects collected in northwestern Colorado in 1909, T. D. A. COCKERELL (*Univ. Colo. Studies, 7 (1910), No. 2, pp. 126–130*).—A list of the Lepidoptera, Hemiptera, Hymenoptera, and Coleoptera collected.

Report of the government entomologist for the year 1909, C. P. LOUNSBURY (*Rpt. Govt. Ent. [Cape Good Hope], 1909, pp. 100*).—The author first discusses the import and internal plant and fruit regulations and the nursery inspection and quarantine act. A large area in the southeast of the Colony is still closed to traffic in apple, pear, and quince fruits originating beyond its limits as a means of checking the dissemination of the codling moth. Efforts to secure the establishment of its ichneumonid parasite, *Caliephialtes messer*, were continued during the year. Three native ichneumonids, *Pimpla heliophila*, *Hymenobosmina pomonellæ*, and another, are known to attack the codling moth larvæ in the Colony but do not appear to be checks of much importance. An egg parasite (*Trichogrammoidea lutea*) is of much greater importance.

Fruit-fly puparia, parasitized by a chalcidid that was introduced into western Australia from India, were received in February and April but apparently failed to become established. Ticks supposed to be parasitized by *Hunterellus hookeri* were received in September from the United States but failed to develop parasites. The white peach scale (*Aulacaspis pentagona*) is kept sufficiently suppressed in Cape Colony so that spraying is not necessary. During the year *Dacus oleæ* was bred from the common wild olive (*Olea verrucosa*). It was found that this, the destructive olive fly of Mediterranean countries, was apparently held in check by a braconid parasite. Another species of wild olive (*O. foveolata*) was found to be attacked by the maggot of a species quite distinct from *D. oleæ*. Demonstrations have been made which indicate that the ravages of the fruit fly (*Ceratitis capitata*) may be very easily and cheaply prevented by the timely application of light sprinklings of poisoned bait over the trees, as previously reported (E. S. R., 21, p. 655). It is also anticipated that the remedy will serve for the control of the melon flies (*Dacus* spp.) which cause very serious losses to cucumbers, pumpkins, and other cucurbits. The formula for the bait now being recommended is arsenate of lead 2 lbs., sugar 25 lbs., and water 40 gals.

Considerable attention was given to the alfalfa or lucerne nematode, *Tylenchus dipsaci* (*devastatrix*). This lives in the parts of lucerne above ground and in numerous other plants, causing malformations and, when present in great numbers, death to the parts affected, if not the whole plant.

The Argentine ant (*Iridomyrmex humilis*) is reported to be a pest in many residences from Sea Point to Wynberg in the Cape peninsula and in many of the smaller cities and towns in the southwestern and southeastern parts of the Colony. It is spreading from the towns into the surrounding country, and the author expects it to develop gradually into a really serious pest in orchards and vineyards. It has also become a nuisance in Bloemfontein, Orange River Colony.

Blastophaga grossorum, the insect necessary for the natural pollination of edible figs, appears to have established itself at Elsenber, Constantia, and Wellington. "The utility of the Blastophaga for other varieties of figs than the 4 Smyrna varieties, Calimyrna, Kassaba, Bulletin, and Bardakjik, introduced by the Government in 1903, was demonstrated by its effect on the well-known and popular Castle Kennedy fig at Constantia."

Detailed accounts are also given of the work against locusts and brief mention is made of the occurrence of fungus diseases.

The entomological section (*Transvaal Agr. Jour., 8 (1910), No. 30, pp. 249–255*).—An account is given by D. Gunn of the mealy stalk borer or mealy grub (*Sesamia fusca*), its life history, and control. Directions for the fumigation of buildings against insect pests and an account of 2 insects new to the Transvaal, the castor-oil borer moth (*Duomites capensis*) and a buprestid beetle attacking peach trees (*Chrysobothris dorsata*), are presented by F. Thomsen.

The pests of New Zealand phormium, T. W. Kirk and A. H. Cockayne (*New Zeal. Dept. Agr. Ann. Rpt., 17 (1909), pp. 286–289, pls. 6*).—The native slug *Janella bitentaculata*, is reported to cause great damage in New Zealand by eating out patches of the undersurfaces of the leaves of phormium, or flax. The caterpillar of a well-known native moth (*Porina signata*) frequently causes the destruction of individual fans and several different caterpillars are responsible for the eating out of the sides and tips of the leaves. Five species of scale insects, namely, *Mytilaspis cordylinidis*, *Poliaspis media*, *Fiorinia stricta*, *Dactylopius calceolariæ*, and *Cœlostoma wairoense* are reported to be common on flax plants in one district.

The enemies of the oat, Brocq-Rousseu and E. Gain (*Les Ennemis de L'Avoine. Paris, 1910, pp. 184, pls. 24; rev. in Amer. Vet. Rev., 37 (1910), No. 2, pp. 150, 151*).—The work is divided into two parts, the first being devoted to the animal and vegetal parasites affecting oats during growth, and the second to those which attack oats after harvest.

A bibliography is appended.

[Orchard insects], (*Better Fruit, 4 (1910), No. 8, pp. 15–33, figs. 40*).—An account is given by C. P. Gillette of orchard insect pests and remedies therefor, including the green aphis and woolly aphis, and the important points to be observed in spraying for the codling moth. B. F. Hurst considers some experiments with spraying and E. D. Ball, the control of the codling moth in the West.

Science's warfare on fruit tree pests, E. P. Taylor (*Nat. Hort., 1 (1910), Nos. 5, pp. 3–5, 15, 18, figs. 8; 6, pp. 3–6, 22, figs. 9*).—A popular account of some of the more important insect pests of fruit trees and the means by which they may be controlled.

The author reports that in experiments made late in the season of 1909 in which arsenate of iron was used in strengths varying from 1 to 3 lbs. of the paste to 50 gal. of water no injury was done to peach foliage. The killing power of the poison was tested upon fall webworms infesting apple trees and promising results obtained in the preliminary trial.

Some wattle insects, C. Fuller (*Natal Agr. Jour., 14 (1910), No. 4, pp. 394–402, pls. 8, figs. 2*).—Brief notes are given on the wattle bagworm froghoppers, and wattle chafers (*Hippopholis sommeri* and *Monochelus calcaratus*).

Termites and living plants, J. Chaine (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), Nos. 7, pp. 328–330; 10, pp. 486, 487; 17, pp. 849–851*).—An investigation of street trees in one locality in the Charente-Inférieure department made during August, 1908, showed 139 of 735 street and park trees examined to be injured by *Termes lucifugus*. The fruit trees most often attacked are the pear, apple, cherry, and fig. Grape vines are also injured.

The occasional injury to shrubs, ornamentals, herbs, and cereals, and the nature of the invasion, are also briefly discussed.

Mallophagan parasites from the California condor, V. L. Kellogg (*Science, n. ser., 31 (1910), No. 784, pp. 33, 34*).—Two species of biting bird lice are reported to have been taken from a single great vulture or condor of California, *Gymnogyps californianus*, which the author has identified as *Menopon fasciatum*, and *Lipeurus marginalis*. These Mallophaga, which are the first to be taken from this bird, also occur upon the two other great vultures of the American Cordillera, the South American condor (*Sarcorhamphus gryphus*) and the king vulture (*Gypagus papa*). This is accounted for through "the occurrence of the parasite type on the common ancestor of all three of the related (although generically distinct) host types, and its persistence practically unchanged on each of the diverging descent products from this original ancestor-host."

Mallophaga from the birds of Laysan Island, V. L. KELLOGG and J. H. PAINE (*Ent. News, 21 (1910), No. 3, pp. 124, 125, figs. 2*).—Eleven species are recorded, of which one (*Docophorus snyderi*) is described as new to science.

Locust destruction, 1909–10, A. VAN RYNEVELD (*Agr. Jour. Cape Good Hope, 36 (1910), No. 2, pp. 158–166*).—This is the report of the chief locust officer on the work carried on in Cape Colony. The colony was again invaded by large swarms of brown locusts in the early autumn of 1909.

Biological notes on oriental Hemiptera, J. C. KERSHAW and G. W. KIRKALDY (*Jour. Bombay Nat. Hist. Soc., 18 (1908), No. 3, pp. 596–598, pl. 1, fig. 1; 19 (1909), Nos. 1, pp. 177, 178, pl. 1; 2, pp. 333–336, pls. 2; 3, pp. 571–573, pls. 2, fig. 1*).—The species noted in these numbers are *Antestia anchorago, Dindymus sanguineus* and *Cænocoris marginatus, Zicrona cærulea*, and *Erthesina fullo*, respectively.

Further notes on the Aphididæ collected in the vicinity of Stanford University, W. M. DAVIDSON (*Jour. Econ. Ent., 3 (1910), No. 4, pp. 372–381, figs. 2*).—In this continuation of the study previously noted (E. S. R., 22, p. 552), 2 species, *Pemphigus ranunculi* on stalks of *Ranunculus californicus*, and *Rhopalosiphum arbuti* common throughout the year on the under surface of the leaves of *Arbutus menziesii*, are described as new.

Plant louse notes, family Aphididæ, C. P. GILLETTE (*Jour. Econ. Ent., 3 (1910), No. 4, pp. 367–371, fig. 1*).—In this continuation of the account previously noted (E. S. R., 22, p. 552), 18 species belonging to the subfamily Aphidinæ are noted.

Scale insects in New Zealand, T. W. KIRK and A. H. COCKAYNE (*New Zeal. Dept. Agr. Ann. Rpt., 17 (1909), pp. 273–285, figs. 14*).—Summarized accounts are given of the life history, habits, injury, and remedies for the more important scale insects with which fruit growers and others have to contend in New Zealand.

Insect pests of coconuts (*Agr. News [Barbados], 9 (1910), No. 202, pp. 26, 27, figs. 4*).—The Bourbon scale (*Aspidiotus destructor*), which occurs in enormous numbers closely packed together on the under side of the leaf, is said to be the most general in distribution and the most severe in its effect on the tree of all the coconut pests. The coconut white fly (*Aleyrodicus cocois*) is also a very severe pest.

Some results from feeding eggs of Porthetria dispar to birds, C. W. COLLINS (*Jour. Econ. Ent., 3 (1910), No. 4, pp. 343–346*).—Of 356 gipsy moth eggs fed to 3 English sparrows, 142 or 40 per cent were found intact in the excrement, of which 7, or 2 per cent of the total number fed, hatched. The approximate number found to be wholly or partly digested was 135, or 38 per cent. Experiments made with a pigeon indicate that the vitality of gipsy moth eggs is totally destroyed by the grinding process in the gizzard.

A new fruit pest, C. FRENCH, Jr. (*Jour. Dept. Agr. Victoria, 8 (1910), No. 1, pp. 50–52, figs. 2*).—*Heliothis armigera* is reported to have caused much injury to the apricot and other stone fruits in South Australia.

On a method of combating the cochylis and eudemis moths, J. CAPUS and J. FEYTAUD (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 21, pp. 1351, 1352*).—A brief report of experiments with *Cochylis ambiguella* and *Eudemis* *botrana*, conducted in French vineyards during 1909, in which the periods most favorable for the application of insecticides were determined.

Some common bagworms and basketworms, C. FULLER (*Natal Dept. Agr. Bul. 16, pp. 11, pls. 3, figs. 14*).—In this paper particular attention is given to the wattle bagworm.

The brown-tail moth in Canada, C. G. HEWITT (*Canad. Forestry Jour., 6 (1910), No. 2, pp. 43, 44*).—During the inspection of European nursery stock in 1909, over a million and a half plants were examined and nearly 200 winter webs were found. During the season of 1910 over 300 webs were found on some 2,000,000 plants inspected.

Crossing of the silkworms, with reference to Mendel's law of heredity, S. ISHIWATA (*Bul. Assoc. Séri. Japon, 1910, No. 215, pp. 1-3*).—In the experiments here reported, the color of the cocoon, marking of the worm, and the number of molts were considered.

The race which spun cocoons of the yellow color was found to be dominant in this respect over those which spun green and those which spun white cocoons, and the green was dominant over the white. In the first generation of crossing between 3-molt and 4-molt races, the worms became mature after the third ecdysis. In the second generation both 3-molt and 4-molt worms were produced, thus showing that the 3-molt habit is dominant over the 4 molt.

On the silk fish line, C. SASAKI (*Jour. Col. Agr. Imp. Univ. Tokyo, 2 (1910), No. 2, pp. 163-181, pls. 3*).—The silk fish line here considered, commonly called "tegusu" by the Japanese, is largely employed by fishermen in all parts of Japan. It is not prepared in that country, however, a large quantity being annually imported from southern China. The author has determined that the worms producing the silk used are the larvæ of *Saturnia pyretorum*. Descriptions are given of the several stages in the life of this species and of the methods of raising the larvæ and of preparing the fish lines in Hainan Island. Cocoons were introduced into Formosa from South China during 1908.

Annual report of the Tasar Silk Rearing Station, Chaibassa, Bengal, for the year 1907-8, F. SMITH (*Ann. Rpt. Tasar Silk Rearing Sta., Chaibassa, Bengal, 1907-8, pp. 11, pls. 2*).—This is the first report that has been issued in regard to this station which was opened in 1906.

Annual report of the Chaibassa Tasar Silk Rearing Station for the year 1908-9, F. SMITH (*Ann. Rpt. Tasar Silk Rearing Sta., Chaibassa, Bengal, 1908-9, pp. 14, pls. 3*).—This, the second annual report, covers the period from April 1, 1908, to June 30, 1909.

Annual report of the Royal Sericultural Station, Padua (*Ann. R. Staz. Bacol. Padova, 36 (1909), pp. 112, pls. 2, fig. 1*).—This report includes a number of papers relating to the silkworm and silk culture. A list, prepared by E. Bisson, is given of the publications related to sericulture that were issued during 1907-8.

The Hessian fly in Illinois, 1910, S. A. FORBES (*Illinois Sta. Circ. 146, pp. 4*).—During 1910 the wheat crop in Illinois was injured by the Hessian fly to a total of several millions of dollars—over $600,000 in one county, according to conservative estimates. In view of the probability that in 1911 the infestation will be larger than usual, the author has prepared and here presents briefly information as to the most approved methods of preventing its injuries.

Gall midges of Aster, Carya, Quercus, and Salix, E. P. FELT (*Jour. Econ. Ent., 3 (1910), No. 4, pp. 347-356*).—Tables are given for the separation of species reared from asters, hickories, oaks, and willows. Nineteen occur upon Aster, 17 upon Carya, 21 upon Quercus, and 46 upon Salix.

Papers on cereal and forage insects.—The smoky crane-fly (Tipula infuscata), J. A. HYSLOP (*U. S. Dept. Agr., Bur. Ent. Bul. 85, pt. 7, pp. 119-132,* *figs. 7*).—Following an introduction briefly reviewing the economic importance of the Tipulidæ, detailed technical descriptions and illustrations are given of the several stages of the smoky crane-fly, *T. infuscata*, which in March, 1908, was reported as completely destroying Japan clover (*Lespedeza striata*) in Madison County, Tenn.

Life history notes are briefly presented. A female that emerged October 13 commenced ovipositing 7 days later. The average number of eggs laid by this species, as determined by confining recently fertilized females in separate rearing cages and by dissecting the abdomens of females that had just emerged, was approximately 300. It is stated that a specimen of *T. angustipennis*, which the author collected at Pullman, Wash., contained 602 eggs and that a confined specimen of an undetermined species of this genus from Kansas laid 417 eggs. It is thought that the eggs hatch in from 1 to 3 weeks.

The larvæ feed upon the roots of various plants, seeming to prefer the Leguminosæ, and, contrary to statements in most published accounts of the habits of these larvæ, they not only suck the juices of the roots but also devour the plant tissue itself. "They feed during the early fall and hibernate as half-grown larvæ, resuming activities in the spring. . . . They become full grown about the middle of July, form perpendicular cells about 3 or 4 in. underground, and remain inactive until about the middle of September, when they pupate. The pupal stage lasts from a week to 10 days. The pupa then, by means of the abdominal spines, works its way to the surface, from which it protrudes about two-thirds of its entire length."

A small tachinid, *Admintia pergandei*, was reared in October from the larvæ. Several predaceous insects and a large number of birds which feed upon Tipulidæ are listed. Remedial measures which have been recommended include sprinkling the ground with salt, herding sheep and hogs in infested fields, and rolling the ground with a heavy roller. "Probably the best method of treating an infested field is to plow the sod under in the early fall and either to run the field into corn, potatoes, and such crops, or to leave it fallow the ensuing summer. Pastures and hay fields in localities where this species is known to be abundant should be grazed off by the middle of September and kept so until late in November, as the adult flies usually congregate in rank growths of grass, clover, weeds, etc., and there lay their eggs."

Combating the olive fly (*Bul. Mens. Off. Renseig. Agr. [Paris], 9 (1910), No. 1, pp. 14–21*).—This is a report of the experiments conducted during 1909.

Fruit flies, T. W. Kirk (*New Zeal. Dept. Agr., Div. Biol. Bul. 22, pp. 18, figs. 2*).—The Queensland fruit-fly (*Tephrites tryonii*), the west Australian fruit-fly (*Halterophora capitata*), and *Ceratitis capitata* are species here considered.

[Preliminary reports on flies as carriers of infection] (*Rpts. Local Govt. Bd. [Gt. Brit.], Pub. Health and Med. Subjs., n. ser., 1909, No. 5, pp. 8, pl. 1*).—Notes are presented by E. E. Austen on the examination of batches of flies received from various centers of London during the summer and autumn of 1908 and a report by J. P. Jepson on the breeding of the house fly during the winter months.

[Further preliminary reports on flies which carry infection] (*Rpts. Local Govt. Bd. [Gt. Brit.], Pub. Health and Med. Subjs., n. ser., 1909, No. 16, pp. 41*).—Four papers are here presented; Memorandum of Investigation into Possible Carriage of Infection by Flies and a Suggested Plan of Campaign in Urban Districts, by S. M. Copeman (pp. 1–4); Notes on Experiments in Coloring Flies for Purposes of Identification, by F. P. Jepson (pp. 4–9); Preliminary Note on Examination of Flies for the Presence of Colon Bacilli, by G. S. Graham-Smith (pp. 9–13); and The Part Played by *Musca domestica* and

Allied (Nonbiting) Flies in the Spread of Infective Diseases—A Summary of our Present Knowledge, by G. H. F. Nuttall and F. P. Jepson (pp. 13–30).

An extensive bibliography accompanies the last-mentioned paper.

The relation of mosquitoes to filariasis in the region of San Francisco Bay, C. WELLMAN, E. VON ADELUNG, and F. M. EASTMAN (*Jour. Amer. Med. Assoc., 55 (1910), No. 3, pp. 217, 218*).—The authors consider that they have shown by the experiment reported that the 2 commonest species of Culex mosquitoes in Oakland, Cal. (*Culex consobrinus* and *C. tarsalis*) were not efficient hosts at room temperature for the nocturnal sheathed microfilariæ occurring in a Japanese patient. They conclude that there is probably little danger that Orientals who are infected with filariæ will infect the inhabitants of the San Francisco Bay cities under present conditions.

Hibernation of mosquitoes in northern China, H. I. CAZENEUVE (*Bul. Soc. Path. Exot., 3 (1910), No. 3, pp. 155–159*).—Observations made on Anopheles at Chinvan-tao, a small port on the frontier of the province of Chili, and of Manchuria, are thought to show that the winter is largely passed in the egg stage. It is stated that the winter is so rigorous in this region that the successful hibernation of adults and larvæ appears to be the exception.

The present epidemic of malaria in the port of Bombay: A description of the mosquito which is carrying the disease, with some remarks on preventive measures, W. G. LISTON (*Jour. Bombay Nat. Hist. Soc., 18 (1908), No. 4, pp. 872–881, pls. 4*).—*Anopheles stephensi* was the species responsible for the transmission of malaria in Bombay, nearly 25 per cent of these mosquitoes when dissected being found to harbor the malaria parasite in some stage of its development. It is said that *A. rossii*, which is met with all over Bombay, has never been observed to be infected in nature.

Health progress and administration in the West Indies, R. W. BOYCE (*London, 1910, pp. XV+328, pls. 47, map 1*).—A report upon the results obtained in combating mosquitoes in the West Indies. See also a previous note (E. S. R., 22, p. 556).

Phlebotomus or sand-fly fever, C. BIRT (*Brit. Med. Jour., 1910, No. 2595, Epit., pp. 875–878*).—The experimental evidence here presented shows that the sand-fly of Malta (*Phlebotomus papatasii*) can convey the virus of this fever and that the bite of only one fly is sufficient for the purpose; also that the sand-flies are infective from 7 to 10 days after sucking virulent blood. This affection, which is prevalent throughout the Mediterranean area, is said to be of short duration and to cause no mortality.

On fever caused by the bite of the sand-fly (Phlebotomus papatasii), T. G. WAKELING (*Brit. Med. Jour., 1910, No. 2598, pp. 1115, 1116*).—An account of this nonfatal, 3 days' fever, which is known to exist in Egypt, parts of Austria, in Malta, and in Italy, and which it is thought will be found widely distributed.

A report of two cases of external myiasis, J. M. SWAN (*Jour. Trop. Med. and Hyg. [London], 13 (1910), No. 1, pp. 1–3, pl. 1*).—*Lucilia sericata* and *L. cæsar* were implicated in the 2 cases here reported from Philadelphia, Pa. The length of time required for the development of *L. sericata* from egg to adult fly was found to be between 15 and 16 days. The eggs apparently developed into larvæ within 24 to 48 hours. The larvæ pupated in 3 or 4 days and imagos emerged 10 days later. The development of *L. cæsar* from egg to imago required from 19 to 20 days. It is estimated that the larvæ emerge from the egg in 12 hours. From 8 to 9 days are passed as larvæ and from 10 to 11 days as pupæ.

The development of trypanosomes in tsetse flies, D. BRUCE ET AL. (*Jour. Roy. Army Med. Corps, 15 (1910), No. 4, pp. 422–443*).—The conclusions arrived at are that *Trypanosoma gambiense* multiplies in the gut of about one in 20

Glossina palpalis which have fed on an infected animal; that the flies become infective, on an average, 34 days after their first feed; that a fly may remain infective for 75 days; that *T. dimorphon*, *T. vivax*, and *T. nanum* may also multiply in *G. palpalis*, which must therefore be looked upon as a possible carrier in these diseases; and that multiplication in the tube of the proboscis is characteristic of *T. vivax*.

A comparative study of 4 genera of horseflies, J. S. Hine (*Ohio Nat., 10 (1910), No. 6, pp. 149–151, fig. 1*).—The 4 genera considered are Lepidoselaga, Selasoma, Bolbodimyia and Snowiellus. These are nearly related in some respects but have not been studied before in a comparative way.

The warble flies, G. H. Carpenter and T. H. Corson (*Dept. Agr. and Tech. Instr. Ireland Jour., 10 (1910), No. 4, pp. 642–650, pl. 1, dgms. 2*).—In this third report of investigations of the life history and treatment of the warble fly (E. S. R., 22, p. 361) the authors give the results obtained during the seasons of 1908–9 and 1909–10. These led them to conclude that a systematic maggot destruction in the spring of any year will reduce the liability of the cattle generally to infection, during a succeeding normal summer, by about 35 per cent, when no concerted action to destroy the warbles has been taken in the surrounding farms. Tables are presented which show again that yearlings are more liable to attack than are calves and that mature cattle are comparatively unmolested.

In muzzling experiments conducted during the summer of 1909, "the leather muzzle was surrounded by a wire cage, with the object of preventing the leather from even touching any part of the calf's body, and so rendering it impossible for the eggs to be sucked in through the small breathing holes." The results led the authors to conclude "that the prevention of licking in the previous muzzling experiments was less perfect than had been supposed, and to admit that these later trials support the view that the maggot (or the egg) may gain entrance to the calf's body by the mouth." They consider squeezing out and crushing the maggots as they mature to be the most effective and certain method of dealing with the pest. Dressing the back of cattle with Archangel tar and paraffin oil in equal proportions is recommended as an alternative to squeezing out. "Maggot-destruction by either method should be done thoroughly at least twice in the season, about the middle or end of April and at the end of May."

Combating the ox warble in Denmark, N. Villemoes (*Ztschr. Fleisch u. Milchhyg., 20 (1910), No. 5, pp. 169, 170*).—A brief report of the work.

A new flea from California, N. C. Rothschild (*Ent. Mo. Mag., 2. ser., 21 (1910), No. 244, pp. 88, 89, pl. 1*).—A number of fleas taken from *Thomomys bottai*, San Francisco, have been found to represent a new species, which is described as *Ceratophyllus franciscanus*.

Papers on cereal and forage insects.—The cowpea curculio, G. G. Ainslie (*U. S. Dept. Agr., Bur. Ent. Bul. 85, pt. 8, pp. 129–142, figs. 3*).—In this summarized account of our present knowledge of the cowpea curculio (*Chalcodermus æneus*), the author presents data regarding its life history and bionomics based upon observations made at Clemson College, S. C., during the summer and fall of 1908 and 1909. During that period it was very abundant and destructive in South Carolina, especially in the vicinity of Clemson College.

"Damage is caused to cowpeas by punctures made in the pods and peas by the adults for the purposes of feeding and oviposition and by the feeding of the larvæ within the maturing peas. . . . The distribution of this weevil probably coincides with that of the cowpea, but since the injury to cotton is more noticeable it has seldom been reported from beyond the cotton belt. . . . In its breeding this curculio seems to be confined almost entirely to the cowpea and closely related legumes. . . . In the spring cotton is often damaged seriously while it is small by the adult beetles, but as this trouble occurs only on land on which cowpeas were grown the preceding year it is apparent that cotton is a food plant from necessity rather than from choice. . . . It is quite possible that when driven to it by hunger in early spring other plants, wild or cultivated, are eaten to some extent."

Technical descriptions are given of its several stages. "Feeding punctures made by both males and females in cowpea pods can not be outwardly distinguished from the egg punctures. . . . If either a feeding puncture or an egg puncture reaches and penetrates a pea it causes an abnormal development of the kernel even though no larva develops. The pea becomes gnarled, one-sided, and light in weight and will be lost in the threshing or winnowing. The damage caused by the feeding operations of the adult beetles on cowpeas is not serious. . . . The egg lies usually within the pea itself, more rarely in the parenchymatous tissue between the peas or between the pod and the pea." In oviposition records of 2 females, kept by H. M. Russell, at Orlando, Fla., in July, 1907, 1 deposited 115 eggs in 10 days and the other 130 eggs in 19 days. The normal incubation period was found to be 5 or 6 days, with a shorter time when the temperature averages higher. The larval period in the pea is said to vary from 7 to 14 days, depending on the temperature and the food supply. Very rarely 2 larvæ reach maturity in one pea, but never more, although several eggs have been found in close proximity. When full grown the larva cuts a hole to the outside of the pea and then through the pod and drops to the ground. In no case out of the several hundred beetles reared by the author did one pupate before leaving the pea and the pod in which the larva developed. After entering the ground the larvæ do not pupate at once, but remain quiescent for several days in the earthen cells. Records of 458 beetles show an average of 17.4 days to elapse between the entrance of the larvæ into the soil and the emergence of the adults. Thus a period of something more than a month is required for the completion of the life cycle.

The tachinid *Myiophasia œnea* was found to parasitize larvæ put in jars in September, 1908, 60 flies appearing in jars in which 683 beetle larvæ had been placed. An examination of the puparium shows that the dipterous larva does not leave the body of its host, but uses it for a pupal case. Two other species of parasites, both hymenopterous, one a Eupelmus and the other a eurytomid, both probably undescribed, have been reared from larvæ of this beetle at Clemson College. There are also published records of *Ennyomma clistoides* and *Sigalphus* sp., as having been reared from *C. æneus* at Baton Rouge, La.

"In so far as cotton is concerned, the sovereign remedy would seem to be to refrain from planting it on land previously occupied by cowpeas infested with this pest. If this is not practicable the cotton may be planted thick, and by delaying the 'chopping' or thinning as long as possible a uniform stand may still be secured. . . . Parasites are so abundant that there is no prospect of serious damage, except for short periods over limited areas."

Some new species of weevils of economic importance, W. D. Pierce (*Jour. Econ. Ent., 3 (1910), No. 4, pp. 356–366*).—The author describes a genus (Lepidocricus) and 5 species as new to science, namely, *L. herricki*, which in 1904 injured cotton at Easter, in Monroe County, Miss.; *Epicærus lepidotus*, collected in Texas; *Phacepholis pallida*, collected from cotton at Corpus Christi and Victoria, Tex.; *Cercopeus artemisiæ*, which was the source of injury to cherry trees at Corvallis, Mont.; and *Ceutorhynchus lesquerellæ*, a pest of cabbage plants at Whitewright, Tex.

Tables for the separation of genera belonging to the tribe Epicærini and of the species of Epicærus are included.

Revision of the coleopterous family Bostrichidæ, P. LESNE (*Ann. Soc. Ent. France, 78 (1909), No. 4, pp. 471–574, pls. 5, figs. 92*).—In this sixth memoir the Dinapatinæ and Apatinæ are taken up.

The root borer of sugar cane (*Agr. News [Barbados], 9 (1910), No. 204, pp. 58, 59, figs. 3*).—A brief account is given of an atack in Barbados by this root borer (*Diaprepes abbreviatus*), which was first noticed in December.

A parasite on codling moth eggs, E. P. TAYLOR (*Nat. Hort., 2 (1910), No. 4, pp. 3, 4, fig. 1*).—Observations made in the Grand Valley of Colorado during the summer of 1910 show a large increase in the number of eggs of the codling moth parasitized by *Trichogramma pretiosa*. The first parasitized eggs were noticed in orchards at Grand Junction on July 19. In counts made on August 2, 40 affected eggs were found to 3 normal ones. "Upon Lawver trees with only scattering apples, which had consequently invited an abundance of codling moth eggs, 170 eggs in all were counted, 154 of which were already showing signs of parasitism, while 16 still appeared normal. This indicated only 9.4 per cent of healthy eggs."

The distribution of the large larch sawfly in Great Britain (*Jour. Bd. Agr. [London], 16 (1910), No. 12, pp. 981–991, figs. 3*).—A report of an investigation made in 1909 of the distribution of *Nematus erichsonii* in Great Britain.

Bee keeping in Ontario, M. PETTIT (*Ontario Dept. Agr. Bul. 182, pp. 7*).—The information here summarized is based upon 488 replies received to questions sent to 2,175 bee keepers of Ontario.

Honey, R. H. MILLWARD (*Bul. Internat. Bur. Amer. Repub. [English Sect.], 30 (1910), No. 2, pp. 229–246, figs. 13*).—Information on the production of honey in Latin America is included in this account.

Cecidology in America, M. T. COOK (*Bot. Gaz., 49 (1910), No. 3, pp. 219–222*).—A brief discussion of the subject.

Ticks and tick-borne diseases, A. THEILER (*Vet. Jour., 66 (1910), No. 416, pp. 98–108*).—Previously noted from another source (E. S. R., 23, p. 488).

Experimental entomology, E. C. COTTON (*Tennessee Sta. Rpt. 1909, pp. 105–107, figs. 2*).—In the experimental work of the year, the life history studies of the fever tick claimed the largest share of attention. "The outdoor incubation and seedtick longevity tests were continued and some valuable results were obtained, confirming in a large measure previous conclusions. The pathogenicity tests were also continued; the lone star tick (*Amblyomma americanum*) and the cayenne tick (*A. cajennense*) being the species studied." A description is given of the refrigerating plant, constructed for studying ticks and insects under constant low temperatures, a detailed account of which has been previously noted (E. S. R., 23, p. 657).

The significance of the courtship and secondary sexual characters of Araneads, T. H. MONTGOMERY, Jr. (*Amer. Nat., 44 (1910), No. 519, pp. 151–177*).—A paper presented before the American Society of Naturalists, at Boston, December, 1909. A bibliography of 32 titles is appended.

Analysis of Paris green, 1909, J. W. KELLOGG (*Penn. Dept. Agr. Bul. 192, p. 37*).—Out of 500 samples of Paris green examined during the year, only 2 were found which contained less than 50 per cent of arsenic combined with copper and 2 which contained more than 3½ per cent of arsenic in water-soluble forms. Many of the samples examined were found to be of better quality than shown by their guaranties.

A new insecticide, H. M. LEROY (*Agr. Jour. India, 5 (1910), No. 2, pp. 138–143*).—The author finds that in India lead chromate has certain advantages over lead arsenate. It is easily made in paste form, is yellow and can be easily seen on a sprayed plant, is extremely insoluble, does not decompose on a leaf, and is not easily washed off. Soluble chromates do not poison plants to the extent arsenic does.

"Lead chromate is made by dissolving in one lot of water potassium bichromate, in another lot of water lead acetate, or nitrate. The two solutions are mixed and a dense yellow precipitate of insoluble lead chromate is formed, and potassium nitrate or acetate. The latter is soluble and is readily washed out of the precipitate." In practice 2 oz. of lead nitrate combines with 1 oz. of potassium bichromate, giving 2 oz. of lead chromate. This is the amount required for 4 gal. of water at full strength or for 8 gal. of water at the usual strength.

FOODS—HUMAN NUTRITION.

Calcium, magnesium, and phosphorus in food and nutrition, H. C. Sherman, A. J. Mettler, and J. E. Sinclair (*U. S. Dept. Agr., Office Expt. Stas. Bul. 227, pp. 70*).—This report, which supplements an earlier bulletin on iron and its function in nutrition (E. S. R., 19, p. 58), includes a general discussion of the subject under consideration and a summary of earlier literature, together with the results of 6 experiments with man on the metabolism of calcium, magnesium, and phosphorus, and a study of the amount of these mineral constituents in typical American dietaries.

Although the results with iron tended to confirm the common assumption that a diet containing liberal amounts of protein will probably furnish at the same time at least adequate amounts of iron, evidently "it can not be assumed that liberal quantities of protein involve adequate amounts of all of the ash constituents. As a rule the dietaries rich in protein are also fairly high in phosphoric acid, but the parallel is not nearly so close here as in the case of protein and iron. With calcium and magnesium the discrepancies are greater, and it can hardly be said that the amounts of these elements run even approximately parallel to the amounts of protein in the 20 dietary studies which have been compared and which are believed to be fairly representative of the food habits of people of at least the eastern half of the United States. In view of these figures it can no longer be assumed that the amount of protein in a dietary is a sufficient measure of its richness in 'building material.' Aside from nitrogen, the elements of 'building material' which appear to require special attention in dietaries are iron, phosphorus, and calcium."

The outline given in the bulletin of the distribution and functions of phosphorus and calcium compounds, as the authors point out, while necessarily incomplete, is yet sufficient to show the great importance of these compounds in the nutritive processes and to emphasize the necessity for adequate supplies in the food.

"Of the various classes of phosphorus compounds found in food, the organic combinations appear in general to be of greater nutritive value than the inorganic forms, and it is probably for this reason that different experiments indicate quite different amounts of phosphorus as necessary for the maintenance of equilibrium in man. From the results here obtained, as well as from the average results of experiments by other observers, it would appear that a healthy man, accustomed to full diet of the ordinary mixture of animal and vegetable food materials, requires for the maintenance of his ordinary store of phosphorus compounds about 1.5 gm. of phosphorus, or nearly 3.5 gm. of phosphoric acid, per day, though under special conditions or with a specially selected dietary equilibrium may be maintained on much less. Many of the dietary studies show so much less than 3.5 gm. of phosphoric acid per man per day as to raise a question whether these people may not have been undernourished in this respect, even though they may have had ample proteins, fats, and carbohydrates. This question merits further investigation.

"Little is known regarding the form in which calcium exists in food materials, and at present differentiation among the different groups of calcium compounds eaten can not be made. Metabolism experiments indicate that a healthy man accustomed to full diet requires about 0.7 gm. of calcium oxid for equilibrium, but many of the dietaries show less than 0.7 gm. calcium oxid per man per day."

Some of the European investigators hold that the food should furnish at least from 1 to 1.5 gm. calcium oxid per man per day. If these estimates of the normal requirement and the estimates of the amounts in typical American family dietaries are even approximately correct, it would follow that a considerable proportion of American families would be benefited by food richer in calcium compounds than that which they habitually consume.

In the case of magnesium the data were not sufficient for general deduction.

"This subject [of calcium metabolism] calls for much more extended study, especially in view of the fact that recent medical observations are tending to show that disturbances of calcium metabolism are connected with a number of abnormal conditions.

"Experimental dietary studies have shown that it is entirely feasible to increase largely the calcium and phosphorus intake by making a more liberal use of milk in the dietary. The same may, of course, be said of the various milk products in which the calcium and phosphorus compounds are largely or wholly retained, such, for example, as cheese, junket, kumiss, buttermilk, or cream. This is probably the simplest and more effective means of improving the dietary as regards calcium and phosphorus compounds, without decreasing its acceptability or materially increasing its cost and with distinct advantages in other directions."

Phosphorus in beef animals, I, II, C. K. FRANCIS and P. F. TROWBRIDGE (*Jour. Biol. Chem.*, *7* (*1910*), *No. 6*, *pp. 481–501*; *8* (*1910*), *No. 1*, *pp. 81–93*).—In the first of these studies of the occurrence of phosphorus in animals, 10 steers and a cow were used, ranging from an emaciated to a very fat condition when slaughtered. Three of the animals had been fed grain and alfalfa hay 2:1, the grain consisting of cracked corn, whole oats, and linseed meal 6:3:1. The remaining animals had been fed grain and alfalfa hay 2.5:1, the grain mixture consisting of cracked corn and linseed meal 8:1. The feeding was continued for varying periods, to suit the experimental conditions. After slaughtering, samples of different cuts were taken for analysis.

The conclusions which were reached follow:

"A method which involves heating of the solution before precipitation of the inorganic phosphorus does not yield results which represent the true condition of the soluble forms of phosphorus compounds in cold water extracts of beef.

"Soluble organic phosphorus compounds existing in beef and in cold water extracts of the same are converted into inorganic forms by heat.

"The change is practically complete when the temperature is maintained at 70° for 15 minutes.

"From 52 to 65 per cent of the total phosphorus in cold water extracts is in the organic form, but may be reduced to from 9 to 20 per cent if heated to about 70°, accompanied by a corresponding increase of the inorganic phosphorus.

"The round cut of beef contains more phosphorus, in forms which are soluble in cold water, than any of the other cuts.

"Phosphorus is found chiefly in the muscular or connective tissue, the fats contain but little.

"The flesh of a thin animal contains more soluble phosphorus than that of a fat animal.

"The quantity decreases with increasing fatness even when it is expressed on a moisture and fat-free basis."

On the second study the authors investigated the distribution of phosphorus in the tissues and organs of beef cattle, using 4 young and 4 mature animals.

The phosphorus content was found to be quite uniform for young animals but so striking an agreement was not found in case of the mature animals. The largest amount of phosphorus, it is stated, was found in the circulatory system and in the nervous system. Two of the mature animals, namely, a cow and a steer, showed abnormally high amounts in the circulatory system. A very thin animal, 3.5 years old, and one of the same age but fairly fat, contained more phosphorus in the nervous system than did the other animals. A Jersey cow, which was the oldest animal examined, showed the highest average amount of phosphorus.

"So far as the phosphorus in the flesh of the cuts is concerned, it is impossible to draw any final conclusion with the amount of data available. . . . The mature cow, however, showed in the flesh cuts a higher phosphorus content than any of the other animals discussed. This can hardly be attributed to condition. Whether it was due to age is a little doubtful [as this animal was only 2 years older than the steer mentioned above as showing abnormally high results in the phosphorus content of the nervous system]. We are more inclined to think that the breed or the high phosphorus diet (bran, etc.) previous to the fattening period may have been influential.

"The wholesale cuts of the 7 steers show an increasing amount of phosphorus, compared on the moisture and fat-free basis, in the following order: Flank and plate; shin, shank, head, and tail; rib, chuck, and neck; loin; round; rump. In other words, those cuts thin in character and which have the largest amount of connective tissue contain the smallest amount of phosphorus."

According to the authors, it was remarkable that one of the steers which was very thin showed a higher percentage of ash in every cut than any of the other animals, though the cuts were comparatively low in phosphorus. Another steer, also thin, contained somewhat less ash but higher amounts than the other animals. One of the steers, which had been well fed and was in excellent condition, gave comparatively low values for ash. "It is to be noted that there seems to be no relation between the phosphorus and the ash. An explanation of the fact can not be attempted until the analyses of the various samples of ash are completed."

The cause and prevention of beri-beri, W. L. Braddon (*London and New York, 1907, pp. XIII+544, chart 1*).—In this monograph of the subject the author has summarized and discussed a very large amount of data regarding beriberi and its occurrence, the relation of this disease to food, particularly rice, the occurrence of beriberi in animals (horses, monkeys, and fowls), the prevention of beriberi, and similar topics.

His general conclusion is that stale decorticated white rice at times contains a poison, the effect of which is to produce beriberi.

"The agent which produces the poison in rice is specific of, or peculiar to, that grain. . . . The beriberi poison is not preformed (or not present in quantity sufficient to cause symptoms) in normal fresh rice seeds, but is adventitious. . . . The pericarp of rice, like the seeds when fresh, contains little or no poison. . . . The formation of poison in stale rice is due to the action of a specific agent upon the dead seeds. . . . The poison of stale rice has an antecedent in fresh rice. The agent must be, therefore, some ferment or parasite or epiphyte peculiar to paddy, . . . probably a surface parasite or epiphyte affecting the seed saprophytically after decortication.

"The beriberi poison is probably an alkaloid which is stable and nonvolatile, and resembles atropin and muscarin in some of its effects. . . . The formation of poison in stale rice is probably due neither to fermentation nor to bacteria, but to the growth in it of a special fungus, . . . like that of toxic rye and lolium, probably a parasite affecting the surface of the seed. . . . If such an agent can invade rice, the analogy of many other vegetable parasites renders it improbable that it should be confined exclusively to that grain. It will be likely, under favoring circumstances, to attack other cereals, which may thus become a cause of beriberi equally with rice. Rice is the common, but not the only, vehicle of the disease. As already set out at length, beriberi is to be conceived of more generally as a grain poisoning."

Composition of food materials, C. F. LANGWORTHY (*U. S. Dept. Agr., Office Expt. Stas. Food and Diet Charts 15*).—Of the 15 charts included in this series 13 give diagrammatic representations of typical foods, their composition being indicated by dividing the outline into proper proportions and coloring the sections to represent the different nutrients. Green is used to represent water, red protein, yellow fat, blue carbohydrates, and gray ash. Energy values are shown by means of black squares, each square inch being equal to 1,000 calories. The 2 remaining charts contain definitions and suggested dietary standards. As a whole the charts are designed especially to facilitate instruction in nutrition matters.

The titles of the charts are as follows: Chart I, Milk and Milk Products; Chart II, Eggs and Cheese; Chart III, Meat—Fresh and Cured; Chart IV, Fish, Fish Products, and Oysters; Chart V, Butter and Other Fat-Yielding Foods; Chart VI, Cereal Grains; Chart VII, Bread and Other Cereal Foods; Chart VIII, Sugar and Similar Foods; Chart IX, Roots and Succulent Vegetables; Chart X, Legumes and Corn; Chart XI, Fresh and Dried Fruit; Chart XII, Fruit and Fruit Products; Chart XIII, Nuts and Nut Products; Chart XIV, Composition, Functions, and Use of Food; and Chart XV, Dietary Standards.

Food inspection decision (*U. S. Dept. Agr., Food Insp. Decision 126, p. 1*).—According to this decision, canned goods prepared after January 1, 1911, will be refused importation and interstate commerce if they contain more than 300 mg. of tin per kilogram, or an equivalent amount of salts of tin.

Official inspections (*Maine Sta. Off. Insps. 24, pp. 73–84; 25, pp. 85–88*).—The results of the examination of a number of samples of canned vegetables, cream of tartar, salt, canned milk, and prepared mustards are reported, and various topics which have to do with the Maine food and drug regulations are discussed, including among others shellfish, currants and raisins, dressed poultry, and cold storage and preserved eggs.

Slaughterhouse refuse [food analyses, and other food topics] (*North Dakota Sta. Spec. Bul. 25, pp. 195–210*).—The authors insist that raw or decomposed slaughterhouse refuse should not be fed to pigs since they consider that it makes the pork unwholesome.

The results of the examination of a number of foods and drugs and the results of milling and baking tests with Velvet Chaff and hard spring wheats are briefly reported. The average yield of flour from the Velvet Chaff wheat was 66.8 per cent and from the hard spring wheats 67.9 per cent. Judging by the volume of the loaf, the Velvet Chaff averaged somewhat better than the hard spring wheats, and was also slightly superior in color.

The bulletin also contains a brief discussion of preserving eggs in limewater, and other nutrition topics.

Treatise on meat inspection, J. RENNES (*Traité de l'Inspection des Viandes. Paris, 1910, pp. VII+368, pls. 73, figs. 87*).—An extended treatise which includes poultry, fish, crustaceans, and mollusks, as well as meat.

The care of milk and its use in the home, G. M. WHITAKER, L. A. ROGERS, and CAROLINE L. HUNT (*U. S. Dept. Agr., Farmers' Bul. 413, pp. 20*).—The bulletin contains three articles, namely: The Care of Milk in the Home, by G. M. Whitaker; The Home Pasteurization of Milk, by L. A. Rogers; and the Food Value of Milk, by Caroline L. Hunt.

The first of these papers gives clear and concise directions for handling milk in a cleanly and careful way. Such topics as receiving the milk, handling and keeping it, the refrigerator and its care, cleaning empty bottles and utensils, and the relation of milk to the spread of contagious diseases are considered. A method of pasteurization suited to household conditions is described in detail in the article on this subject, and the importance of pasteurized milk is pointed out. The importance of milk as food, its composition, and other general questions are briefly considered by Miss Hunt as an introduction to the discussion of the economical use of milk in the home. Recipes are given for milk dishes, and attention is directed to the use of skim milk, buttermilk, and cottage cheese.

The results of an analytical study of certain old wines from the Rhine district, C. VON HEIDE (*Ber. K. Lehranst. Wein, Obst u. Gartenbau Geisenheim, 1909, pp. 160, 161*).—Analyses of 13 samples are reported.

Examination of pure natural wines, vintage of 1908, from the Prussian wine districts, C. VON HEIDE (*Ber. K. Lehranst. Wein, Obst u. Gartenbau Geisenheim, 1909, pp. 151–159*).—Analytical data are reported and discussed.

[The new army ration and other food topics], H. G. SHARPE (*Rpt. Commis. Gen. [U. S. Army], 1910, pp. 30*).—Among the topics discussed in this report are the new army ration, the haversack ration, the Filipino ration, and the emergency ration, the use of fireless cookers in the army, raising potatoes in the Philippines for army purposes, raising beef in the Philippines, and similar questions.

Life on fourpence a day, A. BROADBENT (*Manchester [1910], pp. 8, chart 1*).—Menus are presented and an inexpensive dietary discussed, the whole pamphlet being written from a vegetarian standpoint.

Cookbook for physicians, hygienists, housekeepers, and students, C. JÜRGENSEN (*Kochlehrbuch und praktisches Kochbuch für Ärzte, Hygieniker, Hausfrauen, Kochschulen. Berlin, 1910, pp. XXXVI+465, figs. 31; rev. in Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 10, p. 606*).—A feature of this work is the presentation of the subject in such a way that the nutrients and energy in the food and menus selected may be readily calculated, the author's purpose being to provide information which will lead to the intelligent use of foods.

The teeth and their care (*Ontario Dept. Agr. Bul. 181, pp. 12, figs. 9*).—This bulletin summarizes data on various topics of dental hygiene and the relation of such matters to health.

The influence of alcohol on the composition of urine, W. SALANT and F. C. HINKEL (*Jour. Pharmacol. and Expt. Ther., 1 (1910), No. 5, pp. 493–517*).—Continuing previous work,[a] the authors show that by producing a subacute alcoholic intoxication in properly fed dogs a diminution of the total sulphur, total nitrogen, total and inorganic sulphates, phosphates, and chlorids in the urinary excretion takes place. On the other hand, neutral sulphur and ethereal sulphates are increased. The indican output is diminished.

Food and nutrition investigations of the Office of Experiment Stations—Organization and publications (*U. S. Dept. Agr., Office Expt. Stas. Circ. 102, pp. 22*).—A revision of Circular 89 previously noted (E. S. R., 22, p. 170). The

[a] Proc. Soc. Exp. Biol. and Med., 6 (1909), No. 5, pp. 134, 135.

nutrition work is outlined, the publications listed, and the method of distributing nutrition publications in foreign countries described in detail, the circular as a whole being designed to meet the needs of foreign correspondents who wish to know how the nutrition publications may be procured.

ANIMAL PRODUCTION.

Market classes and grades of meat, L. D. Hall (*Illinois Sta. Bul. 147, pp. 147–290, figs. 75; Abstract, pp. 15, figs. 4*).—It is the author's purpose to describe and illustrate the standard grades of beef, veal, mutton, and pork as they are found in the Chicago wholesale trade, the bulletin being based on a study of the industry at Chicago and in other cities which are supplied from the large houses at the Union Stock Yards, Chicago. The various technical terms commonly used in wholesale meat quotations to designate the different classes and cuts are defined and illustrated. In many cases special illustrations show the methods of cutting meat.

Classifications of meat are more or less flexible, but the one adopted and the grades described are considered as standard or representative. Though the relation of the animal to its meat products is not considered, this description of the cuts should be of value to breeders and feeders who do not have opportunities to secure the information directly. The bulletin is a useful supplement to the bulletins on market classes and grades of cattle, swine, and sheep issued by the station and previously noted (E. S. R., 14, p. 597; 16, p. 905; 20, p. 972).

The general divisions in the beef trade are (1) carcass beef, (2) beef cuts, and (3) cured beef products. The classes of carcass beef are steers, heifers, cows, and bulls and stags. They differ not only in sex, but also in the uses to which they are adapted. The grades within these classes are prime, choice, good, medium, common, and canners, and are based on differences in form, thickness, finish, quality, soundness, and weight. The terms "native," "western," and "Texas" beef each include various classes and grades of carcasses, and refer to general differences in form, finish, and quality. The terms "yearlings," "distillers," "butcher," and "kosher" also include various classes and grades of beef, and merely indicate characteristic features of carcass beef used by certain branches of the trade. "Shipping beef" refers to that sent to eastern cities and consists principally of steers, heifers, and cows of medium to prime grades. Export beef consists largely of medium to prime steers. The "straight cuts" of beef are loins, ribs, rounds, chucks, plates, flanks, and shanks. The grades of beef cuts are No. 1, No. 2, No. 3, and strippers. The grade of a beef cut depends upon its thickness, covering, quality, and weight. Cured beef products are classified as (1) barreled, (2) smoked, and (3) canned beef. Barreled beef is graded as extra India mess, extra plate, regular plate, packet, common plate, rolled boneless, prime mess, extra mess, rump butt, and mess chuck beef, beef hams, and Scotch buttocks. Smoked beef consists of dried beef hams, dried beef clods, and smoked brisket beef. Canned beef consists principally of chipped beef, beef loaf, corned and roast beef.

The divisions of the veal trade are (1) carcass veal, and (2) veal cuts. The grades of carcass veal are choice, good, medium, light, and heavy. The grade of a veal carcass depends upon its form, quality, finish, and weight. The terms "native" and "western" veal each include several grades of calves, and refer to general differences in form, quality, and finish. The regular veal cuts are saddles and racks. They are graded as choice, good, medium, and common, according to the same factors as carcass veal. Subdivisions of the regular cuts are made in some markets and similarly graded.

The divisions of the mutton and lamb trade are (1) carcass mutton and lamb, and (2) mutton and lamb cuts. The classes of carcass mutton and lamb are wethers, ewes, bucks, yearlings, and lambs. The grades within these classes are choice, good, medium, common, and culls, and are based on differences in form, quality, covering, and weight. The shipping trade goes principally to cities in the eastern seaboard States and consists largely of medium to choice lambs. The leading mutton and lamb cuts are saddles and racks, together with legs, loins, short racks, stews, and backs, and are graded in the same manner as carcass mutton and lamb.

Hog products are described under 3 heads: (1) Dressed hogs, (2) pork cuts, and (3) lard. The classes of dressed hogs are smooth, heavy, butcher, packing, and bacon hogs, shippers and pigs, a classification based on the uses to which the hogs are adapted. Distinct grades are recognized only in the packing and bacon classes, the former being based on weight and the latter chiefly on quality and finish. The classes of pork cuts are hams, sides, bellies, backs, loins, shoulders, butts and plates, and miscellaneous. Pork cuts are quoted as fresh pork, dry-salt and bacon meats, barreled or plain-pickled pork, sweet-pickled meats, smoked meats, "English" meats, and boiled meats, respectively. The grading of pork cuts is much more complex than that of other meats. It involves not only their quality, shape, finish, and weight, but also the styles of cutting and methods of packing used. The grades of lard are kettle-rendered leaf, kettle-rendered, neutral, prime steam, refined, and compound lard. The garding is based on the kinds of fats included, method of rendering, color, flavor, and grain.

Influence of age on the economy and profit of feeding calves, yearlings, and two-year-olds, J. H. SKINNER and W. A. COCHEL (*Indiana Sta. Bul. 146, pp. 599–608, figs. 7*).—A summary of experiments previously noted which have been conducted for the past 3 years (E. S. R., 23, p. 772) to determine the influence of age on the economy and profit of feeding cattle.

"The calves required 90 days and the yearlings 20 days longer feeding period than the 2-year-olds, to make them prime. The average daily gain of the calves was 0.61 lb. per head less than that of the 2-year-olds and 0.34 lb. less than that of the yearlings. The average of the three trials shows that the total amount of concentrates (shelled corn and cotton-seed meal) required to finish calves was 3,520.5 lbs. per head, yearlings, 3,547.9 lbs., and 2-year-olds, 3,704.6 lbs. . . . By reducing all to a dry matter basis it will be found that the average amount of dry matter consumed in roughage by calves was approximately 1,745 lbs., by yearlings 2,015 lbs., and by 2-year-olds 2,041 lbs. . . . With uniform prices for feeds, . . . it cost 82 cts. less to fatten a calf than a yearling and $2.60 less than a 2-year-old. . . . The gains on calves amounted to 103 per cent, on yearlings 54 per cent, and on 2-year-olds 43.6 per cent on their initial live weight."

"The pork produced from each bushel of corn fed to calves amounted to approximately 1 lb., to yearlings 1.85 lbs., and to 2-year-olds 2.5 lbs., which would tend to make the difference in profit from feeding even more marked than where the profit on cattle alone is considered."

"The initial cost per hundred of calves is greater than that of older cattle. . . .

"The difference in total quantity of feed necessary for finishing cattle of different ages and fed to the same marketable finish is negligible.

"The average margin required between buying and selling prices to prevent loss was $1.60 per hundred on calves, $1.71 on yearlings, and $1.55 on 2-year-olds; the margins secured on a stationary market were $2.02 on calves, $2.22 on yearlings, and $2.09 on 2-year-olds, resulting in a profit of 42 cts. per hundred on calves, 51 cts. on yearlings, and 54 cts. on 2-year-olds. . . .

"At a uniform price for feeds the difference in cost of gains between calves and yearlings was $1.35, between yearlings and 2-year-olds 28 cts. per hundred pounds.

"The experienced farmer who feeds cattle should handle older cattle in preference to calves; while the farmer who produces and finishes his own cattle may find calves more preferable."

Experiments in beef feeding, F. C. QUEREAU (*Tennessee Sta. Rpt. 1908, pp. 116–118*).—A continuation of work previously noted (E. S. R., 20, p. 665), from which the following conclusions are reached: "Soy beans are the best forage crop that has been tested on the station. The products from the acre of soy beans have fed longer, with greater gains, than either corn or cowpeas. Cowpeas stand next to soy beans and corn comes last. By the return of manure from the feeding of crops there has been a marked increase in the productiveness of the soil, the feeding capacity for 4 steers per acre having been increased in the case of soy beans from 80 days in 1905–6 to 100 days in 1908–9."

Slop feeding, H. E. SAWYER (*U. S. Dept. Agr., Farmers' Bul. 410, pp. 34–40*).—A discussion on the feeding value of distillery slop. Rations proposed by Maercker containing slop are given for young oxen, fattening grown oxen, and dairy cows. The percentage composition of 2 samples of slop calculated to a dry basis are given as follows: Grain slop, protein 25.5 per cent, fat 9.9 per cent, nitrogen-free extract 53.5 per cent, fiber 6.7 per cent, ash 4.4 per cent; potato slop, protein 23.9 per cent, fat 1.5 per cent, nitrogen-free extract 52 per cent, fiber 9.3 per cent, ash 13.3 per cent.

Report on the improvement of hill pasture as determined by effect on stock, R. B. GREIG (*Aberdeen and No. Scot. Col. Agr. Bul. 16, pp. 24*).—A report of 2 experiments, extending from 1905 to 1909, undertaken to ascertain a cheap method of improving poor pasture by means of artificial manures. The effects were determined by weighing periodically the sheep kept on the different plats.

The soil of the pasture at Glen Dye, Kincardineshire, is gravel from decomposed granite. The herbage consisted of inferior grasses, with small patches of rushes and ferns. The commonest plants were sheep fescue, hard fescue, Yorkshire fog, and sweet vernal. Crested dogstail and fine bent were less numerous. White clover plants were not abundant, and this fact together with the relative scarcity of the bent, indicated that basic slag was by no means well suited for this pasture. The growth and decay of the plants had formed a thin layer of humus 2 or 3 in. thick and so closely matted that it was obvious that mineral manures would take some time to reach the roots of the plants. Six blocks containing 3 acres each were treated with basic slag, superphosphate, and kainit. The sheep used were black-faced wethers, the results for the 5 years are shown in the following table:

Results of fertilizer tests for pastures at Glen Dye.

Plat.	Treatment per acre.	Cost of manures.	Total live weight increase of sheep per acre.	Net gain (+) or loss (−) after deducting cost of treatment.	Mean live weight of stock maintained per acre per year.
		s. d.	*Lbs.*	*s. d.*	*Lbs.*
1	10 cwt. basic slag (applied 1905)	30 3	243⅔	− 7 4	198
2	10 cwt. basic slag, 8 cwt. kainit (applied 1905)	48 3	252⅓	−23 1½	195
3	No treatment	....	152	....	112
4	10 cwt. basic slag, 8 cwt. kainit, clover seed harrowed in	50 6	242⅓	−27 9	182
5	10 cwt. superphosphate (applied 1906)	41 3	213	−26	183
6	2 tons lime per acre, mixed with earth (applied 1905)	48	279	−16 3	213

The soil of the pasture at Ardross, in Ross-shire, is light and moorish in character with a fair amount of organic matter; a boggy soil but not deficient in lime and naturally suitable for white clover. There were used 5 plats of 4 acres each. The sheep used were mostly black-faced ewes. The results for the 5 years are given in the following table:

Results of fertilizer tests for pastures at Ardross.

Plat.	Treatment per acre.	Cost of manures.	Total live weight increase of sheep per acre.	Net gain (+) or loss (−) after deducting cost of treatment.	Mean live weight of stock maintained per acre per year.
		s. d.	*Lbs.*	*s. d.*	*Lbs.*
1	11 cwt. basic slag (200 lbs. phosphoric acid) in 1905	28 11	376	+ 6 7	260
2	11 cwt. basic slag (200 lbs. phosphoric acid) in 1905, 8 cwt. kainit (100 lbs. potash)	49 6	386	−11 6	254
3	No treatment	....	234	....	171
4	1 ton ground lime (in 1905)	31	229	−32 3	166
5	White clover and cocksfoot harrowed in (in 1905), no effect being produced, 15 cwt. low-grade basic slag (200 lbs. phosphoric acid) applied in 1907	31 10	313	−12 1	219

The value of the mutton was rated at 3d. per pound.

"The most remunerative application is a dressing of basic slag, and the profit obtainable from slag is chiefly conditioned by the abundance of white clover which the slag can stimulate to rapid growth."

"Where lime is fully effective it is doubtful if it will ever pay its way on poor hill pasture.

"Harrowing and sowing poor pasture with grass and white clover seeds without also manuring it has made no improvement, and sowing white clover seeds on a thick fog to which basic slag and kainit have been applied has made no change in the prevalence of clover plants. Low grade basic slag is quite as effective as high grade slag if the same quantity of phosphoric acid is supplied. Sheep on hill pasture generally make the most rapid growth in the beginning of the season, after which the pasture is better suited to cattle. The best results are obtained when cattle and sheep are grazed together. The calculated figures do not show the full benefits of the treatment. The best plats at both centers are worth 4s. to 5s. more rent per acre than the unmanured plats."

Corn silage for winter feeding of ewes and young lambs, J. H. Skinner and W. W. Smith (*Indiana Sta. Bul. 147, pp. 611–628, fig. 1*).—The purpose of this bulletin is to present the results of 3 years' experiments in feeding corn silage to (1) 41 pregnant ewes due to lamb in March, (2) 31 ewes with fall lambs at their side, and (3) 80 young lambs prior to weaning. The flock consisted mainly of Rambouillets, but included a few cross breds. Besides silage the rations consisted of mixed hay, clover hay, corn stover, oats, shelled corn, and bran.

With the pregnant ewes the average gain per head prior to lambing was 20 lbs. for those receiving silage, and 15½ lbs. for those without silage. There was little difference in the birth rate or in the average daily gains per lamb. This experiment established the fact of the entire safety of good corn ensilage as a feed for lambing ewes.

Other conclusions drawn are the following:

"The ewes due to lamb in the spring which received the silage rations consumed 7.06 per cent less grain and 32.25 per cent less clover hay than those eating the dry rations. For each pound of hay consumed by the pregnant ewes on the dry rations in excess of those on the silage rations, the latter ate 2.48 lbs. of silage.

"The average weight of fleece for the pregnant ewes during the three years was 11.06 lbs. for the ewes fed on the succulent rations, and 11.46 lbs. for those on the dry rations.

"The ewes with fall lambs at their sides and receiving silage gained, on an average for two years, 25.3 lbs., while those eating the dry rations gained an average of 16 lbs.

"The average weight of fleece for ewes with fall lambs was 10.8 lbs. for those receiving silage, and 10 lbs. for those not receiving silage.

"The ewes with fall lambs and receiving silage ate, on an average, 4.82 per cent less grain and 29.86 per cent less clover hay than those not receiving silage. For each pound of hay consumed by the ewes on the ration containing no silage, in excess of that eaten by the silage fed ewes, the latter ate 3.24 lbs. of silage.

"The fall lambs in the silage lots gained, on an average for the two years covered by the experiment, 0.46 lb. per head daily, and those in the lot receiving no silage gained 0.47 lb. These gains, however, are in favor of the silage rations, for the lambs on the former were fed for a shorter time upon the forcing rations supplied during the last 50 days of the test.

"Of the fall lambs sold as 'hothouse lambs' during the spring of 1909, those receiving the silage ration showed a slightly fatter condition of the carcass than those receiving the dry rations.

"The average daily gain of the spring lambs for the three years in the silage lot was 0.46 lb. per lamb; for those in the lot receiving no silage, it was 0.48 lb.

"In the spring of 1907, some time after the close of the regular experiment, four lambs died from the effects, supposedly, of eating spoiled or decomposed silage. The cause was assigned to poisonous products resulting from decomposition of the silage, which was favored by the exposure of the silage to the air in warm weather and the low condition of the silo."

Additional feeding tests comparing dried beet tops, dried beet chips, and meadow hay, W. Schneidewind and D. Meyer (*Deut. Landw. Presse, 37 (1910), Nos. 62, pp. 673, 674; 64, p. 695*).—A continuation of work previously reported (E. S. R., 19, p. 1168). The basal ration for 10 wethers consisted of chaff, straw, blue lupines, poppy cake, peanut cake, and maize. The average daily gains per head in 6 experiments with the different supplements were as follows: Dried beet chips 0.309 lb., dried beet tops 0.235 lb., and meadow hay 0.206 lb.

Pastoral industry of Australia (*Queensland Agr. Jour., 25 (1910), No. 2, pp. 81, 82*).—A brief review of the Australian wool trade for the season 1909–10.

The flocks in Australia and New Zealand increased during the year by 6,179,614 head, the total now being 115,525,581. The quality of the sheep has also increased so that the past season's wool clip has surpassed all previous records. The over-sea shipments for 12 months were 1,921,705 bales from Australia and 512,938 bales from New Zealand. The entire shipment is valued at £33,128,496, an increase of £7,177,584 over the season of 1908–9.

South African wool from a buyer or manufacturer's point of view, W. F. Earle (*Natal Agr. Jour., 15 (1910), No. 2, pp. 222–228*).—A discussion of fineness in wool, high prices, preparation of the fleece for market, and the scale of points adopted by the Judges' Association for the judging of wool.

Feeding experiments with carrots, Albrecht (*München. Tierärztl. Wchnschr., 54 (1910), Nos. 29, pp. 485–489; 30, pp. 505–510; Agr. Mod., 16 (1910), Nos. 35, pp. 480–482; 36, pp. 495, 496*).—No bad effects were noted when carrots constituted about one-third of the ration for goats, although several instances have been reported where carrots have produced pathological conditions in horses and other animals.

Comparative effects of meat meal and fish meal in swine feeding experiments, A. KLEEMANN (*Landw. Vers. Stat., 73 (1910), No. 1-3, pp. 187–219*).—Basal rations of steamed potatoes, potato chips, potato flakes, maize, and phosphate of lime were fed to 6 lots of 4 swine each. The supplementary rations compared were meat meal, fish meal rich in fat, and fish meal poor in fat. Starch was added to the latter ration in order to equalize the amounts of digestible protein and starch values.

In a period lasting 99 days 2 groups receiving the meat meal made an average daily gain per head and day of 0.513 kg., at a cost of 0.172 mark per kilogram (about 4 cts. per pound), and 0.462 kg. at a cost of 0.1838 mark per kilogram, respectively. The 2 lots receiving starch and fish meal deficient in fat made an average daily gain per head and day of 0.511 kg. at a cost of 0.3157 mark per kilogram, and 0.531 kg. at a cost of 0.352 mark per kilogram, respectively. The corresponding figures for the lots receiving fish meal rich in fat were 0.525 kg. at a cost of 0.2796 mark per kilogram, and 0.563 kg. at a cost of 0.2644 mark per kilogram. The feeds were estimated at the following prices per 100 kg.: Steamed potatoes 3 marks, potato chips 13 marks, potato flakes 15 marks, maize 16.9 marks, meat meal 26.5 marks, fish meal 26.8 marks, starch 20 marks, and phosphate of lime 13.8 marks. Analyses of the feeds are given.

The animals in one lot on meat meal were off their feed toward the close of the test, and hence made considerably lower gains than the other lots. The flesh of all the experimental animals was considered of good quality. Samples of flesh taken from the back showed no essential difference in the Reichert-Meissl number or in the melting point, but the iodin number was higher in the fish-fed animals, particularly those fed fish meal rich in fat.

Feeding hogs in the South, D. T. GRAY (*U. S. Dept. Agr., Farmers' Bul. 411, pp. 47, figs. 9*).—This publication, replacing Farmers' Bulletin 100 (E. S. R., 11, p. 381) was written to furnish information of a practical nature for the benefit of those engaged in swine production in the Southern States. The breeds of swine are briefly described, and illustrations are given of 3 types of portable hog houses. The use of dairy by-products and other supplements are discussed, and a large number of feeding tests made at the state stations are cited. Evidence is presented in support of the argument that hogs can not be profitably raised on corn alone.

The advantages of using pasture are summarized as follows: "Pork costs only one-third to one-half as much when pastures are used as when concentrated feeds alone are used. The soils are improved very materially as a result of growing the legumes for the hogs and feeding extra grains to the animals. The crops are harvested (through the hogs) without danger of loss from rains and without expense. The hogs are under favorable health conditions; therefore losses from disease will be lessened."

Preservation of beet pulp by lactic ferments, L. MALPEAUX (*Betterave, 20 (1910), No. 513, pp. 291–294; Sucr. Indig. et Colon., 76 (1910), No. 13, p. 292–296*).—Directions are given for using a commercial ferment (lacto-pulpe), with which the beet pulp is inoculated when put into the silo. A brief report is made of investigations on the chemical changes which take place in the ensiled pulp.

Methods of computing rations, A. KRAEMER (*Landw. Jahrb., 39 (1910), No. 3, pp. 439–459, fig. 1*).—Illustrations are presented of a method of computing rations for live stock, based on the valuation of dry matter, protein, and the starch values of Kellner.

The feeding and fertilizer value of feeding stuffs estimated mathematically, V. BRDLIK (*Monatsh. Landw., 3 (1910), No. 7, pp. 211–223*).—The use of the method of least squares is suggested for estimating the value of feeding stuffs. Examples are given in the application of this method.

Game farming, J. L. COWAN (*Sci. Amer., 103 (1910), No. 12, p. 212*).—A popular article on the opportunities for rearing bison, elk, Angora goats, and fur-bearing animals.

The conformation of spayed cows, J. TANDLER and KELLER (*Zentbl. Physiol., 23 (1909), No. 26, pp. 1036, 1037*).—Measurements were made on 11 mature cows which had been spayed when 6 months of age. As compared with unspayed animals they had a longer head and horns, less pronounced facial parts, longer limbs, broader back, smaller rump, and narrower pelvis.

On the deviation of the length of the gestation period according to the season of the year, O. WELLMANN (*Landw. Jahrb., 39 (1910), No. 3, pp. 409–428*).—With brood mares the average length of the gestation period in the case of 5,437 births was 334.67 days. The periods were shortest in the births which occurred in July, the average length for that month being 321.94 days. From July there was a constant increase from month to month until May, when it reached 346.11 days. With working mares the average length in 171 cases was 325.63 days, with a seasonal variation as in the case of brood mares. The average gestation period of 228 Hungarian cows was 284.61 days, and of 291 Simmental cows 291.2 days. Apparently there was also a seasonal variation in cows, but much less in amount than in the case of horses.

Estimation of the live weight of animals by measuring, J. FRISCHAUF (*Landw. Jahrb., 39 (1910), No. 3, pp. 373–396, figs. 2*).—The author discusses a number of systems of estimating the live weight of animals, and presents a system of his own which is explained in detail.

The significance of circulation of air in stalls, LUDEWIG (*Arch. Wiss. u. Prakt. Tierheilk., 36 (1910), Sup., pp. 299–305*).—Experiments in measuring the resistance of wire screens to drafts of air are reported.

Both the size of the wire and the size of the mesh were found to affect the amount of resistance to air currents. It is thought that a double gauze screen made of wire 0.6 mm. in diameter, with a mesh from 0.5 to 1 mm., will offer enough resistance to air currents so that they may be placed on the windward side of the stable. In this way an abundance of pure air may be supplied without causing dangerous drafts.

Animals of antiquity.—I, Mammals, O. KELLER (*Die Antike Tierwelt. I, Säugetiere. Leipsic, 1909, pp. XII+434; rev. in Nature* [*London*], *84 (1910), No. 2134, pp. 357, 358*).—This is the first volume of a work containing the results of an exhaustive investigation of the records left by ancient peoples concerning the wild and domesticated animals known to them. The aim was to identify the different species described or depicted and to work out their past history and geographical distribution, particular attention being paid to the larger domesticated mammals.

Deficiencies of the chromosome theory of heredity, M. F. GUYER (*Univ.* [*Cincinnati*] *Studies, 2. ser., 5 (1909), No. 3, pp. 19*).—The facts concerning the theory that chromosomes are the exclusive vehicles of heredity are herein summarized, the conclusion being drawn that a satisfactory case has not yet been presented. The author believes that other germ cell constituents may also stand in casual relationship to adult characters. "Heredity is a problem of the handing on of metabolic energies already established, rather than of the transmission of a series of determinative units which create a wholly new organism."

An interesting donkey hybrid, R. I. POCOCK (*Nature [London], 84 (1910), No. 2133, p. 329*).—A description of a cross between a male dziggetai or Mongolian donkey (*Equus hemionus*) and a female Nubian donkey (*E. asinus*). The hybrid resembles a pure bred African donkey. The color is gray, with legs strongly barred with black, and a sharply defined black shoulder stripe and black mottling at the base of the long ears.

DAIRY FARMING—DAIRYING.

A study of the cause of wide variation in milk production by dairy cows, C. H. ECKLES and O. E. REED (*Missouri Sta. Research Bul. 2, pp. 107–147, figs. 2*).—During the first 2 lactation periods the better of 2 Jersey cows from the same sire produced 2.8 lbs. of milk and 3.9 lbs. of fat for each pound produced by her half-sister, and an investigation was made to determine the cause of this variation. In the third lactation period the 2 cows calved 3 days apart, and were fed and cared for under identical conditions for 1 year. The ration consisted of choice alfalfa hay, silage, and a grain mixture of corn, bran, and oil meal 4:2:1. During the summer green alfalfa and green corn were also fed. Both cows were kept farrow, and milk records, analysis of feeds, and amounts of feed consumed are presented in tabular form.

In the early part of the lactation period a digestion trial showed practically identical results. The coefficient for the better cow was 64.39 per cent of the dry matter, and for the other 64.99 per cent. At the end of the milking period a maintenance trial showed only a slight difference in cost of maintenance, the higher requirement being with the better cow. The real cause of difference in production was found to be in the amount of feed consumed above maintenance, the better cow using for maintenance only 35 per cent of the total food consumed and the other 55.8 per cent. After deducting the maintenance requirement one cow produced milk as economically as the other.

In general the better cow consumed 1.7 lbs. of feed for 1 lb. consumed by the other cow, and produced 2.67 lbs. of milk and 2.77 lbs. of fat for each pound produced by the inferior cow. The better cow required for maintenance for the entire period 1,200.8 lbs. of grain, 1,204.5 lbs. of hay, and 4,818 lbs. of silage, which left available for milk production 2,223.2 lbs. of grain, 1,699.5 lbs. of hay, 3,960 lbs. of silage, and 4,323 lbs. of green feed. The inferior cow required for maintenance 1,065.8 lbs. of grain, 1,065.8 lbs. of hay, and 4,292.4 lbs. of silage, leaving available for milk production 841.2 lbs. of grain, 632.2 lbs. of hay, 795.6 lbs. of ensilage, and 2,102 lbs. of green feed. The milk production of the better cow was 8,522.9 lbs. of milk, containing 5.51 per cent fat, and that of the other cow 3,188.9 lbs. of milk, containing 5.31 per cent fat.

Data are also presented of 2 other cows kept for an entire lactation period under conditions identical with those above described. The feed consumed during the lactation year minus the estimated maintenance was the amount considered available for milk production, and the ratio between the food available for milk production and the milk produced was practically the same with each of the 4 cows. The available feed consumed and the milk solids produced were also calculated in calories in order to reduce all to a common basis, and these ratios were also found to agree closely in all 4 animals.

"The main difference between profitable and unprofitable dairy cows is not to be found in the coefficient of digestion, or in the amount of food required for maintenance. A superior dairy cow is simply one with a large capacity for using food above the maintenance requirement and one that uses this available food for milk production."

Cost of production of milk, J. P. GRIER (*Prairie Farmer, 84* (*1910*), *No. 20, pp. 8, 9, 23*).—A paper read before the American Chemical Society at Chicago in September, 1910, which contains an itemized account of a 160-acre farm near Elgin, Ill. The cost of producing milk according to the figures submitted was 2.43 cts. per pound.

Report of the dairyman, F. H. DENNISS (*Tennessee Sta. Rpt. 1909, p. 101*).—During 1909 the average cost of keeping the station herd of 30 cows was $5.66 per cow greater than for 1908, due to a more liberal grain ration. The average increased production for each cow over 1908 was 375.2 lbs. of milk and 23.14 lbs. of butter fat, and the average increased profit per cow was for milk $4.72 and for butter $11.01.

Has colostral milk bactericidal properties? M. BUB (*Centbl. Bakt.* [*etc.*], *2. Abt., 27* (*1910*), *No. 13–16, pp. 321–336*).—The growth of *Bacillus pyocyaneus*, paratyphus bacillus A and B, and common coli bacilli, was retarded when colostral milk was inoculated with pure cultures of these organisms. In some cases there was an actual decrease of the bacteria normally present in milk 12 hours after milking. The retarding effect on bacterial growth was found to vary in colostral milks from different individuals, but the author thinks it doubtful if colostral milk has germicidal properties, as the restraining force was due, in part at least, to agglutination. Phagocytosis had no essential share in restraining the development of the germs.

Results of milk tests in the vicinity of Chemnitz, A. BEHRE (*Milchw. Zentbl., 6* (*1910*), *No. 9, pp. 394–407*).—Analyses of goat's and cow's milk are reported. As a rule the morning milk was lower in fat and total solids than the evening milk.

Testing cream for butter fat, O. F. HUNZIKER ET AL. (*Indiana Sta. Bul. 145, pp. 531–595, figs. 18*).—The purpose of the experiments described in this bulletin was to determine definitely and bring out clearly the lack of uniformity in the results of the Babcock test with cream, and to recommend modifications of the test to remove its objectionable features; also, to increase the accuracy and reliability of the test without curtailing its simplicity and rapidity.

The method of calibration of Babcock test bottles is described, and the burette method is recommended. Glassware such as is used in Indiana creameries, numbering in all 6,513 pieces, was tested by the station. The results showed that 18.8 per cent of the cream test bottles and 1.1 per cent of the milk test bottles were incorrect.

"The errors in the cream test bottles ranged from 0.5 per cent to 10 per cent. The errors in the milk test bottles ranged from 0.2 per cent to 2 per cent. In the case of some creameries their entire outfit was inaccurate."

The factors which entered into the selection of the style of cream test bottle to be used in creameries and the necessity of taking accurate and aliquot portions of composite samples are discussed. The use of cream sampling tubes (cream thieves) is not recommended, because the mechanical condition of most of the gathered cream is such that most of these contrivances are hindrances.

The daily shipments of cream from 6 patrons were sampled for single and for composite tests. The single sample tests averaged 39.5 per cent of fat. The composite samples were kept under different environments for 2 weeks, with the following results: In an ice box, tightly sealed, 39.5 per cent of fat; loosely sealed, 40.5 per cent; and open, 43 per cent; left in the receiving room, tightly sealed, 43 per cent; loosely sealed, 44 per cent; and open, 50 per cent; near the boiler, tightly sealed, 44.5 per cent; loosely sealed, 46.5 per cent; and open, 69 per cent. Tests with different types of bottles for storing samples showed that the abandonment of bottles sealed with paper caps or jelly glasses sealed with tin lids will save the average creamery several hundred dollars per month. Bottles with glass stoppers form the most satisfactory seal, but are expensive. Cork stoppers of good quality form a tight seal, but have a tendency to loosen automatically. The increase in the test due to storing varied with the amount of cream in the sample jar. With the size of the bottles unchanged, the smaller the amount of cream, the greater the increase in the percentage of fat. Each step in the process of testing cream is critically discussed, and suggestions are offered for more accurate testing.

"Ninety-six tests with cream and acid at temperatures ranging from 40 to 110° F. showed no visible changes in the percentage of fat and the clearness of the test where the amount of acid used was governed by the color of the mixture. Where the amount of acid was not regulated by the color of the mixture, but where the same amount of acid was used at all temperatures, the resulting tests varied widely. In the case of cream and acid at 40°, it required more shaking to effect complete action of the acid on the cream, but the tests were clear and the percentage of fat correct. In the case of cream and acid at 100° or above, the tests were very dark and charred, and the meniscus difficult to read."

"The average of the tests with two additions of water practically agreed with the gravimetric fat estimation. The average of the tests with one addition of water was 0.17 per cent higher than the gravimetric fat estimation."

A series of 547 tests was made in an 18-inch tester. The speed used varied from 100 to 1,000 revolutions. A reduction of speed from 1,000 to 400 revolutions caused a gradual decrease in the test of 0.34 per cent of fat.

A series of 26 test bottles, comprising 18 gm. 50 per cent, 18 gm. 40 per cent, and 9 gm. 50 per cent bottles, were filled to the necks of the bottles with water and weighed on analytical balances. Pure butter fat was added and after weighing the bottles were then whirled in the tester at full speed and the tests were read at 135 to 140°, this being the temperature at which pure butter fat has a specific gravity of 0.9. The meniscus amounted to exactly 1 per cent, except in two of the 9 gm. 50 per cent bottles, where it was 1.25 and 1.5 per cent, respectively. On repeating the experiment with cream the individual results lacked uniformity; nevertheless, a comparison between these averages and those obtained from the experiment with pure butter fat showed unmistakably that the fat column of the ordinary cream test was not pure butter fat, but contained impurities, mainly water and acid. A further study led to the following conclusions:

"The percentage of impurities contained in the fat column varies with the speed of the tester and the amount of sulphuric acid used. Low speed and excessive acid increase the impurities.

"All of the fat in the cream does not appear in the fat column. The fat lost in the test is the residual fat and a portion of the volatile fatty acids.

"The loss of residual fat is greatest at a low speed and with insufficient or excessive amounts of acid. The loss of volatile fatty acids increases with the increase in the amount of acid used.

"The losses due to residual fat and escape of volatile fatty acids are practically offset by the gains due to impurities in the fat column, provided that the test is made under normal conditions."

Tests made from a hot and moist tester and those from a cool and dry tester showed no greater variation in the impurities of the fat column than tests from the same tester. Samples of cream varying widely in richness were tested in 9 gm. and in 18 gm. 50 per cent cream test bottles, where the charges were 9 and 18 gm. respectively. The results showed that the richness of cream, style of test bottle, and size of charge had no appreciable effect on the percentage of residual fat. There was no noticeable difference between sweet and sour cream. The differences between the percentage of volatile acids of tests made in the cool, and those made in the hot, tester were no greater than the variations of tests made in the same tester. There was a loss of glyceryl of the volatile acids, but the loss was too small in amount to affect the test.

Readings with and without the meniscus were found to deviate when compared with the gravimetric fat estimation. In order to eliminate disturbing factors, readings were made with a mirror, and when read to the bottom of the meniscus they compared most closely with the gravimetric determinations. It is recommended that the mirror be used in reading all cream tests and that the meniscus be eliminated. For this purpose glymol (petrolatum liquidum U. S. P.), commonly known as white mineral oil, proved superior to alcohol or paraffin. Directions are given for its use.

The various experiments show to what extent composite sampling and testing are unreliable, and indicate that even in testing cream upon its arrival at the creamery more precautions are necessary than is customary in many creameries and receiving stations.

Australian butter boxes (*Queensland Agr. Jour., 23 (1910), No. 4, p. 230*).—Notes are given concerning the manufacture of butter boxes from straw pulp and from waste paper of indurated fiber.

It is claimed that the straw pulp butter box is odorless and impervious to moisture. The color is dark gray and hence not so attractive as the ordinary butter box made from white pine. The sides and bottom of the indurated fiber box are molded in one piece and the lid is fixed with nails. The cost is much less than the ordinary wood box and it can be made quite strong.

Report on cheese, H. WEIGMANN (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 6, pp. 376–405*).—This report classifies the different varieties of cheeses, and describes the methods of cheese analysis. A discussion of this report by the Association of German Food Chemists is appended.

Microbes in the cheese industry, P. MAZÉ (*Indus. Lait. [Paris], 35 (1910), Nos. 28, pp. 459–462; 29, pp. 473–479; 30, pp. 487–492; 31, pp. 507–510; 32, pp. 523–525; 33, pp. 535–541*).—A popular discussion of the fermentations induced by the more important species of organisms concerned in the cheese ripening process.

Some English cheeses (*N. Y. Produce Rev. and Amer. Cream., 30 (1910), No. 22, p. 808*).—Details are given of the methods of making Cheddar cheese in Somerset, Wensleydale cheese, and Dorset Blue cheese.

Analyses of Queensland cheeses, J. C. BRÜNNICH (*Queensland Agr. Jour., 23 (1910), No. 4, pp. 227, 228*).—Analyses of large cheeses, loaf cheese, white cheese, and Cheddar cheese are reported.

Notes on Cheddar cheese making, F. HERNS and G. G. PUBLOW (*Ontario Dept. Agr. Bul. 183, pp. 19, figs. 10*).—The topics treated in this bulletin are branding cheese boxes, finishing cheese, the curd knife, pure cultures, improving late fall cheese, acidimeter tests, advantages of pasteurizing whey, and the use of whey tanks. Five different systems of heating whey are illustrated and described. Experiments on the cost of heating whey indicated that the average cost should be from about 55 to 75 cts. per ton of cheese. It cost 10.7 cts. to elevate for pasteurizing 20,000 lbs. of whey with a 1½ in. rotary pump.

Brussels cheese, L. MARCAS and C HUYGE (*Rev. Gén. Lait, 8 (1910), Nos. 11, pp. 249–255; 12, pp. 273–280*).—A biochemical study of this cheese, which is properly known as Ettekeis or Fromage Dur in order to distinguish it from Plattekeis or Fromage Blanc. It is a soft cheese, made only in the vicinity of Brussels, with a strong penetrating odor and a characteristic flavor not common to any other cheese. When it is made in factories the milk curds are brought from surrounding farms in a state of putrid fermentation, and containing a great variety of molds, bacteria, and enzyms. The growth of these organisms is checked by salting.

Many ripe cheeses were examined, and although many organisms were found which contributed to the curing process there were only 2 which were constantly present, one a yeast and the other a motile diplococcus. The peculiar characteristics of the cheese, however, could not be obtained when pure cultures of these 2 organisms, either singly or combined, were used. A third organism commonly present was a nonmotile diplococcus, which undoubtedly contributed to the ripening process.

Chemical studies were also made of the ripening. The acidity of fresh curds was found to be very variable. Analyses are reported which were made at different periods of ripening.

Coulommier cheese, JANET McNAUGHTON (*Canada Dept. Agr., Dairy and Cold Storage Branch Bul. 25, pp. 7, pls. 2*).—This bulletin, which was prepared because of the growing demand for a small cheese which can be put on the market in a few days, describes in detail the methods of manufacturing a small French cheese known as Coulommier. This cheese is easy to make, yet one of the most profitable. It is flat, round, 5½ in. in diameter, and from 1 to 1½ in. thick, weighing from 12 to 16 oz. It is creamy white in color. Artificial coloring is seldom added, though a few drops is considered an improvement by some makers. In consistency it resembles cream cheese, but is not so rich in flavor. It can be eaten fresh in from 3 to 4 days from the beginning of making, although ordinarily it is preferred from 1 week old or more. One gal. of milk will make 2 cheeses, worth about 15 cts. each.

The manufacture of Altenburg goat cheese, A. NAUMANN (*Molk. Ztg. Berlin, 20 (1910), No. 29, pp. 339, 340*).—Details are given of the method of manufacturing this variety of soft cheese which is commonly made of mixed goat's and cow's milk.

Gorgonzola cheese (*Public Health [London], 24 (1910), No. 1, p. 38*).—Analysis of the plaster on the rind of a Gorgonzola cheese showed that it contained 13.8 per cent tallow and 86.2 per cent barytes colored with oxid of iron. The plaster was ¼ in. thick and constituted 21.7 per cent of the piece of cheese purchased in the market. The effect of the plaster was to set up decomposition inside of the cheese, so that the part nearest the rind was unfit for food.

Two defects of Edam cheese, F. W. J. BOEKHOUT and J. OTT DE VRIES (*Rev. Gén. Lait, 8 (1910), Nos. 14, pp. 313–322; 15, pp. 347–356; Centbl. Bakt. [etc.], 2 Abt., 28 (1910), No. 4–5, pp. 98–111, figs. 2*).—An investigation of the cause of the small lenticular cracks about 1 cm. long, known as "Boekel's crevices," revealed the fact that they were caused when the cheese mass was not plastic enough for the interior gases to collect equally from all directions. Since the plasticity is diminished as paracasein bilactate is formed, as in the case of "short" cheese (E. S. R., 21, p. 679), the defect can be remedied by adding about 10 to 15 per cent of water to the milk used for cheese making. In this way the formation of an undesirable amount of paracasein bilactate is prevented.

The second defect studied was the formation of large cracks in cheese known as "knijpers." These cracks were found to be the results of gas formation, also due at least in part to an excessive amount of paracasein bilactate.

Pasty cheese, G. F. EICHEL ET AL. (*N. Y. Produce Rev. and Amer. Cream., 30 (1910), No. 22, pp. 810, 811*).—A symposium by practical cheese makers on the causes and means of preventing pasty cheese.

VETERINARY MEDICINE.

A text-book of veterinary anatomy, S. Sisson (*Philadelphia and London, 1910, pp. 826, figs. 588*).—In this work the author presents the essential facts regarding the structure of the principal domesticated animals. A large number of the illustrations are original, a majority being reproduced from photographs.

"Veterinary anatomical nomenclature is at present quite chaotic in English-speaking countries. In this work an attempt is made to eliminate some terms which do not appear to the author to fulfill any useful purpose, and others which are clearly erroneous or otherwise undesirable. In many cases the terms agreed upon by the congresses at Baden and Stuttgart are adopted either in the original Latin or in anglicized form; otherwise these terms are added in parenthesis. The author favors the substantial adoption of this terminology, but considered it desirable to offer a sort of transitional stage at present."

Principles of electro-therapeutics for veterinarians, J. Tereg (*Grundriss der Elektrotherapie für Tierärzte. Berlin, 1902, pp. VII+222, figs. 93*).—This work treats briefly of the principles of electricity and its various currents. The various forms of measuring apparatus, the physiological action of the electrical current, and the use of the isolated constant and faradic currents as a diagnostic and curative medium in veterinary medicine, are also discussed.

A text-book of pharmacology and therapeutics, A. R. Cushny (*Philadelphia and New York, 1910, 5. ed. rev., pp. 744, figs. 61*).—This work has been revised and brought up to date. It has several valuable new features and has been arranged to conform with the new pharmacopœia.

Therapeutic technique, W. Schlampp (*Therapeutische Technik. Stuttgart, 1907, vol. 2, 1. half, pp. 314, figs. 88; 1908, vol. 2, 2. half, pt. 1, pp. 317–522, figs. 124; 1910, vol. 2, 2. half, pt. 2, pp. XV+525–1026, figs. 130*).—In this second volume, which completes the work previously noted (E. S. R., 17, p. 1111), the author discusses therapeutic measures applicable to the digestive, generative, respiratory, and urinary organs and the circulatory and nervous systems.

Experimental investigations and clinical findings concerning the applicability of novocain for the purposes of veterinary medicine, A. Fehse (*Abs. in Amer. Vet. Rev., 37 (1910), No. 4, pp. 442–451*).—"Novocain is a rapid and reliable anesthetic, which produces absolutely no irritative phenomena in animal tissue, even when employed in concentrated solution. For operation, the subcutaneous or cutaneous application of a 1 to 2 per cent aqueous solution is sufficient. Novocain exerts no deleterious effect upon tissue repair. In eye operations a 5 to 10 per cent novocain solution, instilled into the conjunctival sac, produces within a relatively short time an anesthesia entirely sufficient for operative procedures. A harmful influence upon the function of the eye is not apparent. Even when brought in substance upon the cornea, novocain does not give rise to local pathological changes other than an episcleral vascular congestion."

Digest of comments on the Pharmacopœia of the United States of America and the National Formulary, M. G. Motter and M. I. Wilbert (*Pub. Health and Mar. Hosp. Serv. U. S., Hyg. Lab. Bul. 63, pp. 464*).—This is a digest of comments on the eighth decennial revision of the United States Pharmacopœia and the third edition of the National Formulary for the year ended December 31, 1907.

Notes on stock medicines, W. Robertson (*Agr. Jour. Cape Good Hope, 37 (1910), No. 1, pp. 38–45, figs. 4*).—A list of remedies which are necessary on the farm for emergency purposes.

Rules and regulations pertaining to the inspection and testing of live stock intended for importation from the mainland of the United States to

the Territory of Hawaii (*Honolulu: Bd. Agr. and Forestry 1910, pp. 11; Hawaii, Forester and Agr., 7 (1910), No. 2, pp. 58–65*).—These rules and regulations, approved by the governor December 31, 1909, became effective January 1, 1910.

Light and ventilation, D. H. Udall (*Amer. Vet. Rev., 36 (1910), No. 5, pp. 589–595*).—A paper presented at the annual meeting of the New York State Veterinary Medical Society, at Ithaca, August, 1909.

The practical utilization of the anaphylaxis reaction, K. Schern (*Arch. Wiss. u. Prakt. Tierheilk., 36 (1910), Sup., pp. 590–610*).—The author finds the anaphylactic test of value for detecting mastitis by the aid of the mammary secretion, poisonous or foreign seeds in feeding stuffs, and rye bran and peanut meal. Neither passive nor active anaphylaxis was of any value in detecting tuberculosis or glanders.

The relationship between scarlet fever, diphtheria, and sore throat of man, and diseases of the udder and teats of cows, A. Gofton (*Vet. Jour., 66 (1910), No. 424, pp. 568–586*).—A brief discussion, in which the literature is reviewed.

An epidemic of Malta fever in the Department of Gard, P. Aubert, P. Cantaloube and E. Thibault (*Ann. Inst. Pasteur, 24 (1910), No. 5, pp. 376–394, pl. 1*).—A contribution to the epidemiology of Malta fever in France.

Report on experiments undertaken to discover whether the common domesticated animals of Terceira Island are affected by plague, A. de Souza, Jr., J. Arruda and M. Pinto (*Jour. Hyg. [Cambridge], 10 (1910), No. 2, pp. 196–208*).—In the experiments reported, calves, pigs, and dogs were found to be refractory to the plague.

"The experiments made on rabbits led us to conclude that this animal is, on Terceira Island, very susceptible to plague. . . . According to these experiments the ferret is an animal susceptible to plague, but only able to contract an acute form of this disease by inoculation of large doses. However, as the ferret sucks the blood of the rats its use in hunting these animals is not recommended. The experiments corroborate those of the Austrian commission that cats can be infected by plague per os, after which they show autopsy appearance very similar to those of cats spontaneously infected by plague with buboes in the neck.

"The general conclusion which is drawn from the experiments on 4 kinds of birds, namely, pigeons, ducks, turkeys, and chickens, especially in regard to the latter, is that these animals are insusceptible to plague."

Investigations of recurrent fever and the method of its transmission in an Algerian epidemic, E. Sergent and H. Foley (*Ann. Inst. Pasteur, 24 (1910), No. 5, pp. 337–373, fig. 11*).—Experiments indicate that *Pediculus vestimenti* may transmit the infection.

Anaplasma marginale n. g. and n. sp., a protozoan parasite of cattle, A. Theiler (*Bul. Soc. Path. Exot., 3 (1910), No. 3, pp. 135–137*).—The forms observed by various writers in the blood of cases of bovine piroplasmosis associated with the piroplasmata and previously described by the author as "marginal points" (E. S. R., 22, p. 487) are now considered a protozoan species and to represent a new genus.

Anaplasma marginale, A. Theiler (*Ann. Transvaal Mus., 2 (1910), No. 2, pp. 53–55*).—This paper presents evidence to show that the so-called marginal points represent a distinct genus and species, *A. marginale* (see above).

The incubation period, when transmitted by ticks, is much longer than that following the injection of infectious blood, the experiments showing the period to vary from 55 to 75 days. The author considers anaplasmosis to be, in all probability, the disease which has hitherto been known as gall sickness. This species and 3 others (*Piroplasma bigeminum*, *P. mutans*, and *Spirochæta theileri*) which can be transmitted through the inoculation of blood and by ticks, occur in South Africa.

On the development of piroplasma in the different organs, R. GONDER (*Ann Transvaal Mus., 2 (1910), No. 2, pp. 49–52, pls. 3*).—The author finds *Piroplasma parvum* and *P. mutans* to show differences in their cycle of development, as well as in their pathogenic effect. The blue bodies are said to represent a certain stage in the development of *P. parvum* which corresponds to the shizogony in the cycle of the malarial and other parasites.

The life history of Trypanosoma dimorphon, E. HINDLE (*Univ. Cal. Pubs., Zool., 6 (1909), No. 6, pp. 127–144, pls. 3, fig. 1*).—A report of studies made of *T. dimorphon*, in which rats and guinea pigs were used.

Bacteriological diagnosis of anthrax and symptomatic anthrax in veterinary inspection practice, FOTH (*Arch. Wiss. u. Prakt. Tierheilk., 36 (1910), Sup., pp. 93–107*).—A discussion with regard to the relation of the bacteriological to the clinical and anatomical findings in cases of anthrax and symptomatic anthrax.

Anticharbon vaccination with very virulent bacteria and in a mixture with pyocyaneus, J. D'AGATA (*Ann. Inst. Pasteur, 24 (1910), No. 4, pp. 330–336*).—These tests were made with sheep and rabbits and bouillon cultures of pyocyaneus and anthrax bacteria. Some of the tests were conducted with the culture of anthrax bacilli alone, and others with a bouillon culture of anthrax and pyocyaneus bacteria. The tests showed that the anthrax bacillus when cultivated with pyocyaneus bacilli lost their virulency for rabbits.

[Immunizing tests with "farase" and horses and other animals against glanders], F. BAUTZ and S. MACHODIN (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 12, pp. 264–266; abs. in Zentbl. Allg. u. Expt. Biol., 1 (1910), No. 7–8, p. 236*).—These tests were conducted with Levy's "farase" (E. S. R., 19, p. 887; 20, p. 1085), and showed its harmlessness when used for cats, guinea pigs, and foals, and produced a fairly lasting immunity.

Studies in regard to the etiology of rabies, J. KOCH and P. RISSLING (*Ztschr. Hyg. u. Infektionskrank., 65 (1910), No. 1, pp. 85–112, pls. 3*).—The material employed consisted of the brains of 50 dogs artificially infected, and further, of the brains of dogs sent to the laboratory for diagnosis. Some bovine brains were also examined.

The authors were able with the aid of Heidenhain's hematoxylin stain to note cocci-like formations in the gray substance of the horn of Ammon. Negri bodies were either absent or only sparingly present. In various instances many of the above-mentioned cocci bodies could be noted in the ganglion cells and beside the Negri bodies. The gray matter of the brain cortex also was profusely studded with these dot-like bodies. In the degenerated ganglion cells of the brain and spinal cord, particularly in the cervical and lumbar region of the cord of the animals in early and late stages of the disease "endocellular enclosures" could be detected with the hematoxylin stain. These appeared as small monococci, diplococci, or rods and had the appearance of the inner formations of the Negri bodies. The author believes these cocci-like bodies to be parasites, and that the Negri bodies are only reaction products in the horn of Ammon.

Facts and problems of rabies, A. M. STIMSON (*Pub. Health and Mar. Hosp. Serv. U. S., Hyg. Lab. Bul. 65, pp. 90, pls. 4*).—This bulletin reviews the present state of our knowledge of rabies, and includes the history, geographic distribution, etiology, symptoms, diagnosis, immunity, treatment, and suppressive measures.

Report of the committee on standard methods [American Public Health Association] for the diagnosis of rabies, ANNA W. WILLIAMS (*Amer. Jour. Pub. Hyg., 20 (1910), No. 3, pp. 704, 705*).—The following points are to be studied by the research workers for the following year: "Comparison between virulence of saliva and brain and of time the Negri bodies appear in brain; public attention directed to importance of keeping biting animals under observation, only killing in case of need of immediate protection against an otherwise uncontrolled animal; length of time such suspected animals should be kept; advice to give users of milk from infected cow—here should be determined what percentage of infected cows have infected milk, and degree of infection of such milk; . . . simplify method of diagnosis; . . . localization of well-developed bodies—for instance, in a certain percentage of rabid cases well-developed bodies are found in the cerebellum and not in Ammon's horn; number of smears studied in doubtful cases before deciding that the case is not rabies; . . . relative value of rabbits and guinea pigs for the inoculation test."

The histologic diagnosis of rabies, G. VOLPIUS (*Ztschr. Hyg. u. Infektionskrank., 65 (1910), No. 1, pp. 113–120*).—The material examined consisted chiefly of stray dogs and 1 pig. Negri bodies were present in all cases, whether the subdural inoculation furnished positive or negative results. The applicability of the direct smear, teasing, and sectioning methods, and the various staining methods are discussed with relation to determining as to the protozoan nature of the excitor of rabies.

Bacteriological examination of the sputum of bovines affected with lung tuberculosis, HIERONYMI (*Arch. Wiss. u. Prakt. Tierheilk., 36 (1910), Sup., pp. 108–152*).—As a result of the clinical examination and of that of the sputum of suspected and tuberculous cows the author states that where the clinical diagnosis is negative the absence of the tubercle bacilli in the sputum is very valuable in substantiating the absence of tuberculosis. In 62 per cent of all cases tubercle bacilli were identified microscopically by suitable homogenizing and staining methods. Enriching and cultivation methods, which have been so successfully applied in human medicine, were not very efficacious in this work. The most sensitive means for examining tuberculosis-suspected sputum is the animal test.

[Sputum sampler for animals], H. TALLGREN (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 29, p. 577, fig. 1*).—A description of Graae and Tallgren's apparatus for collecting sputum from tuberculous or suspected animals. The instrument is placed in the esophagus and fastened with a string to the horns of the animal, and the animal, by irritation, made to cough.

Treatment of tuberculosis by a new method, E. P. WARD (*Ztschr. Tuberkulose, 16 (1910), No. 2, pp. 151–160, figs. 2*).—This consists of repeated injections of nuclein compounds.

The relation of leukemia in bovines to tuberculosis, E. NEUMANN (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 29, pp. 579–581*).—The author states that leukemia and tuberculosis do not occur in the same individual, and that leukemia in animals is a strong expression of a progressively inherited immunity.

The effects of a restricted diet and of various diets upon the resistance of animals to certain poisons, R. HUNT (*Pub. Health and Mar. Hosp. Serv. U. S., Hyg. Lab. Bul. 69, pp. 93*).—"A restricted diet markedly increases the resistance of certain animals to acetonitrile. Guinea pigs upon a limited diet excrete a smaller percentage of the cyanogen of acetonitrile as sulphocyanate than do those upon an unrestricted diet. This result is interpreted as showing that certain specific processes of metabolism are retarded in partial inanition.

"Diet has a marked effect upon the resistance of animals to certain poisons; the resistance of some animals may be increased fortyfold by changes in diet.

Certain diets, notably dextrose, oatmeal, liver, and kidney, greatly increase the resistance of mice to acetonitrile; their effect is similar in this respect to the administration of thyroid. The effect of an oatmeal diet in increasing the resistance of certain animals to acetonitrile is probably due in part to a specific effect of the diet upon the thyroid gland; this is an illustration of how an internal secretion may be modified in a definite manner by diet. Diet has, in certain cases, a marked effect upon the reaction of animals to iodin compounds; this effect is probably exerted largely through the thyroid. The condition of the latter is more important than the chemical form in which the iodin is administered. Certain diets (notably eggs, milk, cheese, and various fats) greatly lower the resistance of certain animals to acetonitrile; their effect is the opposite of that of thyroid.

"Several glands (notably prostate, ovaries, and testes) have an effect upon the resistance of animals to poisons similar to but much less marked than that of thyroid. Other glands (thymus, parathyroid, suprarenals) have either no effect or an effect opposite to that of thyroid. The resistance of animals to propionitrile is markedly influenced by diet. Diet causes distinct but not very marked differences in the resistance to morphin. Season has an important effect upon the resistance of animals to certain poisons; in some cases these effects seem to depend upon seasonable variations in the activity of the thyroid.

"The experiments show that foods such as enter largely into the daily diet of man have most pronounced effects upon the resistance of animals to several poisons; they produce changes in metabolism which are not readily detectable by methods ordinarily used in metabolism studies. The ease and rapidity with which certain changes in function are caused by diet are in striking contrast with the essentially negative results obtained by the chemical analyses of animals fed upon different diets."

Chronic infectious intestinal catarrh of bovines, Miessner and Trapp (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 30, pp. 593–595*).—Enteritis chronica infectiosa bovis, which is enzootic in certain barns where the infection is transmitted by means of the feces of diseased animals and is probably introduced by new animals being brought in the herd, attacks cows from 3 to 6 years old. Calves or young animals seldom take the disease.

The pathological anatomy shows a more or less definite thickening and rugation of the mucous membrane of almost the entire intestinal tract, with the exception of the rectum and the duodenum. The lymph nodes are as a rule enlarged and moist. Histologically, the mucosa and submucosa are found infiltrated with epithelial giant and round cells. Caseation is never present. The initial symptoms consist of a diminution in the milk secretion, diarrhea, thirst, and emaciation despite the fact that good amounts of food are eaten.

The disease is caused by an acid-fast bacillus, which could not be cultivated artificially. It differs from tuberculosis and is a disease sui generis. The animals do not react toward bovine tuberculin but do toward avian tuberculin. The treatment thus far has been unsuccessful.

Contagious pleuro-pneumonia in cattle, A. R. Ward (*Philippine Agr. Rev. [English Ed.], 3 (1910), No. 9, pp. 507–510*).—Contagious pleuro-pneumonia appeared on July 14 among range cattle received in Manila from Wyndham, West Australia.

"Within the city of Manila, 7 corrals were infected by Australian cattle. These were placed under quarantine. . . . One shipment of 398 head showed 9 per cent infected, another of 262 head showed 6 per cent infected. Some of these cattle showed evidence that they had been infected with pleuro-pneumonia for at least a year. Two Indo-Chinese animals exposed to infection from Australian cattle showed unmistakable evidence of the disease."

A general order, which follows this account, was designed to meet the requirements of the case with as little loss to importers as possible.

A new sheep disease caused by Diplococcus (Streptococcus) lanceolatus, A. GAERTNER (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 30, pp. 595–597; Centbl. Bakt.* [etc.], *1. Abt., Orig., 54 (1910), No. 6, pp. 546–563*).—A description of the clinical and pathological findings with cases of this disease, which was found at several points in Germany. A bacteriological examination of all the internal organs revealed the presence of a lancet-like diplococcus which grew well in agar, blood agar, potato, Loeffler's serum, bouillon, and milk.

The scab act, 1909 (*Dept. Agr. Orange River Colony Bul. 21, pp. 121–142*).—This act provides for the eradication of sheep scab in sheep and goats.

Diseases of the hog, A. T. PETERS (*Bd. Live Stock Comrs. Ill. Bul. 2, pp. 44, figs. 9*).—Brief popular accounts are given of the many diseases to which the hog is subject.

Report of the veterinarian, M. JACOB (*Tennessee Sta. Rpt. 1909, pp. 112, 113*).—During the year the efficiency of hog cholera immunizing serum was demonstrated in several herds. Two pigs immunized at the station were housed in a pen with 9 pigs affected with hog cholera. Although 7 of the diseased pigs died and the other 2 gradually recovered but remained unthrifty for several months, the 2 vaccinated pigs never lost a meal and continued to fatten. During an outbreak of the disease on another farm, 45 unvaccinated hogs died, while only 2 of 36 animals vaccinated by the serum-alone method succumbed and both of these were suffering from the disease when treated. A sow that was vaccinated remained well, while her 5 pigs, which were unvaccinated, died of the disease.

[Krafft's vaccine against hog cholera], K. VON SANDE (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 29, pp. 581, 582*).—A criticism of Krafft's method of preparing vaccine, which the author, like Poppe (E. S. R., 23, p. 486), does not consider of value.

Hog cholera and serum vaccination, A. T. PETERS (*Bd. Live Stock Comrs. Ill. Bul. 1, pp. 13, pls. 6*).—This is a popular account.

Sporothrix and epizootic lymphangitis, C. G. PAGE, L. FROTHINGHAM, and J. B. PAIGE (*Jour. Med. Research, 23 (1910), No. 1, pp. 137–150, pls. 5*).—Studies of an organism obtained in pus from affected horses are here reported. The affection, which occurred among horses and mules in a limited district in western Pennsylvania, had previously been reported to be epizootic lymphangitis.

"The disease is said to be characterized by the appearance of subcutaneous nodules with thickening of the surrounding lymph vessels. The nodules break down, forming multiple chronic abscesses, which as a rule finally heal. The pus is known to contain the infectious agent or virus."

The results have been summarized as follows: "The horses from which the organism described above was isolated were apparently not affected with the epizootic lymphangitis of Tokishiga. The only organism to develop—a sporothrix—is unlike the *Saccharomyces farciminosus*, but is identical with that isolated by Dr. Hyde from a man. It is probably the same as that isolated by Schenck, Hecktoen and Perkins, de Beurmann and others. The sporothrix exists in very limited numbers in the pus from closed lesions—more numerous in open lesions—of affected animals and persons. It will remain alive in dry pus kept at a mean temperature of 7° C. for at least 3 months. It is infectious for man, horses, mice, rats, and presumably some other animals. There seems to be no better culture medium than potato, upon which growth is visible in 2 to 4 days at a temperature of 20 to 28°."

A list of 18 references is appended.

The higher animal parasites, M. KOCH (*Ergeb. Allg. Path. Mensch. u. Tiere, 14 (1910), pt. 1, pp. 41–135*).—The literature issued during the period from 1904 to 1908, relating to the trematode, cestode, nematode, and arthopod parasites affecting man, is reviewed in connection with lists of references.

The gid parasite and allied species of the cestode genus Multiceps.—I, Historical review, M. C. HALL (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 125, pt. 1, pp. 68, fig. 1*).—The name *Multiceps multiceps* is proposed here for the first time to be used for the bladderworm of sheep, usually known as *Cœnurus cerebralis.*

The history of the occurrence of this species is taken up at length. The author concludes that cases of gid were seen by Hippocrates 4 or 5 centuries B. C. While the time and manner of introduction of this parasite into the United States is not known, the author is of the opinion that it must have taken place previous to 1886, in which year it was first recorded from Brazil, and via either the dog or sheep. "The writer has collected evidence in Montana indicating that the gid parasite has been imported in dogs in some instances and the disease spread by the sale or gift of these dogs and their offspring."

Proof of the actual occurrence of gid in this country was first recorded by Ransom in 1905 (E. S. R., 16, p. 1133), though sheepmen claim to have had losses between 1885 and 1890. Reports from other sources indicate that it was also present the same year in Missouri, Kansas, Ohio, Colorado, and Indian Territory. In Montana, gid is known to have occurred in Teton, Chouteau, Valley, Cascade, Fergus, Gallatin, and Yellowstone counties, the first 4 and probably northern Dawson County being on infected ranges. The first authentic report of gid in the eastern United States was by Law in 1909, and by Taylor and Boynton (E. S. R., 23, p. 87). As yet there is no positive record of its occurrence in Canada.

The sheep, cow, goat, horse, chamois, mouflon, gazelle and some antelope forms—given as antelope, African antelope, *Bubalis* sp. and *Hippotragus equinus* (?)—are accepted as hosts of the larval *M. multiceps.* "The parasite is recorded from sheep in Greece, Germany, Switzerland, England, France, Italy, Ireland, Holland, Scotland, Austria, Denmark, Iceland, Argentina, Sardinia, South Australia, New Zealand, German Southwest Africa, and the United States. . . . It is recorded from cattle in Switzerland, Germany, England, Italy, France, Iceland, Denmark, and Cape Colony. It is recorded and figured from the goat in Holland." So far as the author is aware, the dog is the only known host of the adult *M. multiceps,* and he has personally examined tapeworms from coyotes and other wolves trapped in Montana.

The economic importance of gid, alleged causes of gid, names applied to gid and gid-affected animals, and common names of the gid parasite, are discussed and the synonymy of the genus and species presented. The figures given for the United States, and the author's personal investigation in Montana, show losses of from 2 or 3 to 10 per cent among some Montana flocks, and amounting to $10,000 in some years.

The second species considered, *M. serialis,* was first described in 1847 from a rabbit. The larval *M. serialis* "has been claimed to occur in the hare, rabbit, squirrel, copypu, goat, horse, klippdachs, sheep, and cat. Records of its occurrence in the hare and rabbit are undoubtedly correct, the records from the squirrel are probably correct, those from the coypu and goat may be correct, the record from the horse is doubtful, as heretofore indicated, and those from the hyrax, sheep, and cat are errors. . . . The parasite has been reported from France, England, Scotland, Italy, Russia, Siberia, Switzerland, Australia, New Zealand, Japan, India, and the United States. Whether the parasite occurs in Germany is doubtful." The larval stage is a very common parasite of rabbits in the western part of the United States. The dog is the only host in which the adult *M. serialis* has been found or produced. While the species is of comparatively little economic importance, it deserves attention from an economic standpoint largely because some scientists insist on identifying it with the highly important *M. multiceps*. A complete synonymy of the species is included.

Historical sketches and the synonymy of 3 additional species of the genus Multiceps are given, namely, *M. lemuris*, described from the liver and thorax of *Lemur maco; M. polytuberculosus*, described from the leg of the jerboa (*Dipus sagitta*); and *M. spalacis*, described from *Spalax capensis*. *Cysticercus botryoides*, described from the back muscles of a rabbit and *Acephalocystis ovis tragelaphi*, from *Ovis tragelaphus* are retained under the original names as species inquierenda.

Two new species of Aprocta, A. RAILLIET and A. HENRY (*Bul. Soc. Path. Exot., 3 (1910), No. 3, pp. 152–155*).—Two species belonging to the nematode genus Aprocta, one taken from the preorbital sinuses of a bustard (*Otis tarda*) from Abyssinia, the other from the suborbital sinuses of a hooded crow (*Corvus cornix*), are here described as new to science.

Some remarks of the genus Leucocytozoon, C. M. WENYON (*Parasitology, 3 (1910), No. 1, pp. 63–72*).—In reviewing recent papers relating to parasites of leucocytes, the author calls attention to the fact that as a generic term Leucocytozoon must be restricted to the bird parasites, the leucocytic parasite of mammals being excluded. "As the complete life cycle of the hemogragarines has been followed in only one instance, there are insufficient data for splitting up the group, so that it is at present safer to include in the group Hemogregarina the hemogragarines of the cold-blooded animals and the very similar parasites of the red blood corpuscles and leucocytes of mammals. If it be found that the life-history of the leucocytic parasites of mammals differs markedly from that of the type species of hemogregarine (*H. minima*) then the name Hepatozoon of Miller will have priority."

A bibliography of the literature referred to is appended.

The leucocytozoa, a rejoinder to C. M. Wenyon, ANNIE PORTER (*Parasitology, 3 (1910), No. 2, pp. 239–244*).—An answer to the above.

A Leucocytozoon of a turtle dove (Turtur humilis) and of a teal duck (Querquedula crecca) from Tonkin, C. MATHIS and M. LEGER (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 3, pp. 118–120*).—In 4 of 9 turtle doves examined a Leucocytozoon was found to which has been given the name *L. marchouxi*. This parasite could not be found in any of six *T. rupicola* nor in 176 domestic pigeons that were examined.

Three of 8 teal ducks were found parasitized by a new species which has been named *L. simondi*.

RURAL ECONOMICS.

[Report on small holdings and allotments, 1909], E. J. CHENEY and M. T. BAINES (*Bd. Agr. and Fisheries [London], Rpt. Land Div. 1909, pts. 1, pp. 108, maps 2; 2, pp. 109–288; abs. in Jour. Bd. Agr. [London], 17 (1910), No. 4, pp. 302–304*).—This is a report of the small holdings commissioners under the small holdings and allotments acts for the year 1909. Part 1 deals with small holdings, and part 2 with allotments and miscellaneous land acts in Great Britain.

"Considerable progress has been made during the past year in satisfying the demand for small holdings, and the position on December 31 last was that 60,889 acres had been actually acquired or agreed to be acquired for small holdings by county councils in England and Wales, of which 34,234 acres had been purchased for £1,107,215, and 26,655 acres leased for rents amounting to £33,611. Of this land vacant possession had been obtained of 38,126 acres, and 36,845 acres had been actually let to 2,793 individual small holders, and 28 acres sold to two small holders. In addition 2,674 acres had been let or arranged to be let to 17 cooperative small holdings associations, who had sublet the land to their members, and 1,648 applicants had been provided with over 20,000 acres by private landowners direct, mainly through the instrumentality of the councils. The land which has been acquired but not yet allotted will probably provide for another 2,000 applicants, so that assuming that the associations have sublet their land to not fewer than 200 tenants, which is a moderate estimate, it will be seen that the act has resulted in the provision of land for approximately 6,600 applicants in two years.

"During 1909 3,598 fresh applications were received by county councils for 63,523 acres, bringing the total number of applicants since the act came into operation up to 26,883, and the total quantity of land applied for up to 437,124 acres. Of these applicants 15,191 had been provisionally approved for 216,863 acres up to the end of 1909."

Interesting reports are given on some of the small holdings already established, together with detailed information as to the provision for small holdings in each county.

In the report on allotments it is stated that the total quantity of land held for the purpose of allotments by the various local authorities in England and Wales on December 31, 1909, was 26,764 acres, of which 5,687 acres were the property of the councils, and 21,077 acres were leased. This land is let to 90,550 individual tenants, 21 associations, and 1 committee.

"The number of applications received for allotments in 1909 was 16,996, the total quantity applied for being 6,048 acres; 2,407 acres were acquired, as compared with 1,253 acres in 1908, and 5,818 individual applicants and 9 associations were provided with allotments by local authorities, in addition to a large number of applicants who were provided with allotments on land previously acquired."

The relation of cooperation to small holdings (*Jour. Bd. Agr.* [*London*], *17* (*1910*), *No. 5, pp. 395–397*).—A discussion of the advantages of cooperation for the success of small holdings in England, summarized from the report of the small holdings commissioners for 1909 as noted above.

The small agricultural holding in France, its present position and prospects (*Dept. Agr. and Tech. Instr. Ireland Jour., 10* (*1910*), *No. 4, pp. 662–669*).—The data contained in this article have been derived from an address by J. Ruau, minister of agriculture in France (E. S. R., 21, p. 189) and a monograph on agricultural small holdings in France (E. S. R., 22, p. 395).

The new agrarian laws in Roumania, Hitier (*Bul. Soc. Nat. Agr. France, 70* (*1910*), *No. 6, pp. 501–516*).—The author describes the gradual lowering of the economic condition of the peasant class in Roumania from the period of emancipation in 1864 to 1907, which culminated in the agrarian revolution of that year, and discusses the main features of the laws of 1907–8 relating to agricultural contracts, rural banks, and limiting the extent of farm holdings, which were passed for the purpose of correcting the abuses affecting the agricultural classes.

The economic and social significance of these laws is pointed out, one of the most striking results being the formation of farm laborers' associations which rent or purchase large farms and conduct their operations. The success of these associations is shown by their growth. On December 31, 1904, they numbered 17 and paid rent amounting to \$57,900, while on January 31, 1909, 99 of such associations operated about 189,000 acres and paid about \$607,000 in rent. The method of conducting these farm associations is briefly described. See, also, the following article.

Agricultural cooperation in Roumania (*Census and Statis. Mo.* [*Canada*], *3* (*1910*), *No. 28, pp. 228, 229*).—An account is given of the rapid development of agricultural cooperation in Roumania from 1902 to 1909, particularly of agricultural mutual credit banks and peasant associations for the cultivation of farms in common.

On September 1, 1902, the banks numbered 700, with 59,845 members and a paid-up capital of $820,366; while on December 31, 1908, the number had increased to 2,410, with 346,707 members and a paid-up capital of $7,305,416. The deposits, which were $469,205 in July, 1904, had increased to $1,188,638 at the close of 1908.

Similar progress is noted for the peasant associations cultivating farms in common. On June 30, 1909, they numbered 229, with 25,000 members farming cooperatively 405,250 acres and paying annual rents amounting to $892,239. These associations, with skilled agriculturists at their head, will, it is believed, become veritable schools of agriculture through which the Roumanian peasantry will learn to cultivate better and more economically, obtaining at the same time a more abundant yield.

[Land tenure and agriculture in Australia], G. H. KNIBBS (*Off. Yearbook Aust., 3* (*1901–1909*), *pp. 245–483, dgms. 6*).—Detailed accounts with statistical data for the years 1860 to 1908 are given of the land system, agriculture, forestry, and fisheries in Australia, including data on land legislation, forms of land tenure, land settlement, government resumption of alienated lands, classification and number of holdings, pastoral and agricultural production, agricultural colleges and experimental farms, government loans to farmers, farmyard and dairy production, forests, forest reserves, and forestry industries and production, commercial fisheries, and the export trade in the different products mentioned.

South Africa as the future emigration place for the masses, F. GESSERT (*Deut. Kolon. Ztg., 27* (*1910*), *No. 33, pp. 547, 548, fig. 1*).—The advantages which South Africa offers to emigrants desirous of engaging in agricultural pursuits are briefly discussed in this article.

Agricultural societies and rural welfare, SALM (*Deut. Landw. Presse, 37* (*1910*), *Nos. 40, pp. 431, 432; 42, p. 457*).—The author means by rural welfare all those measures which aim to improve the economic, physical, moral, and educational life of the agricultural population. This article shows the ways in which agricultural cooperative societies can bring about improvement, particular stress being laid on the education of members in general knowledge and in the technique of agriculture by means of night and winter schools, establishing circulating libraries of readable agricultural literature, furnishing aid in cases of sickness or death, giving premiums to farm domestics when a certain sum has been saved, and other economic and educational features which tend to raise the farm laborer to a condition of independent initiative.

The cultivation of idle city land, J. H. DIX (*Twentieth Cent. Mag., 2* (*1910*), *No. 12, pp. 483–492, figs. 8*).—An account of vacant lot gardening in various cities, particularly in Philadelphia, its economic and social benefits, and its effectiveness in preparing city workers for more extended agricultural labor.

Agricultural graphics: United States and world crops and live stock, M. SMITH (*U. S. Dept. Agr., Bur. Statis. Bul. 78, pp. 67, charts 88*).—This bulletin shows "graphically the production of the principal crops and the number of live stock in the United States, by States, in the decades 1899–1908 and 1869–1878, and like data for the principal countries of the world in specified periods. Graphic representations are also included for the United States of other crops in various years, of population engaged in agricultural pursuits and in all pursuits, value of all farm products; value of farm land, buildings, and implements; and acreage of farm land."

Imports of farm and forest products, 1907–1909 (*U. S. Dept. Agr., Bur. Statis. Bul. 82, pp. 74*).—Statistical data of farm and forest products, including the countries from which consigned, are reported. The value of farm products imported for the fiscal year ended June 30, 1909, was $638,612,692, and the value of forest products, $123,920,126, as compared with $539,690,121 and $97,733,092, respectively, in 1908 (E. S. R., 22, p. 293).

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 12 (1910), No. 10, pp. 73–80*).—Notes and statistics are given on the condition of crops in the United States and foreign countries, and on the farm values and range of prices of agricultural products, the crop export movement in 1910, and the monthly marketings by farmers for 1908 and 1909 in the United States, with an estimate of the percentage of the rice area of the United States devoted to the different varieties.

AGRICULTURAL EDUCATION.

Rural Life Conference (*Alumni Bul. Univ. Va., 3. ser., 3 (1910), No. 3, pp. 225–335, pls. 2*).—At this, the third Rural Life Conference to be held at the University of Virginia, July 13–15, 1910, the papers presented included the following:

The outlook to rural progress, L. H. Bailey (pp. 229–240).—The subject is presented under the general heads of (1) some relations of the city and country, (2) the country-life movement, (3) the outcome of our industrial civilization, and (4) the call to leadership. The author holds that the fundamental weakness of our civilization lies in the antagonism of country and city forces, and the development of urban influence far beyond that of the country. The first remedy is to send broadly trained men into the open country, and the second to give rural representation on equal terms with the city on all great public questions. "Rural teachers, librarians, clergymen, editors, physicians, and others may well unite with farmers in studying and discussing the rural question in all its aspects." The call to leadership should appeal particularly to the new profession of the rural teacher.

The aim in teaching agriculture, J. F. Duggar (pp. 240–246).—The author considers the aim in agricultural teaching to be twofold—(1) to develop or educate the individual, and thereby (2) to promote the material prosperity of the community, State, and nation. The study of agriculture by the children in the schools leads to practical improvement by the parents on the farm, and increased profitableness of the farm supports improved work in the schools. As to methods of teaching, the author advises (1) teaching the great principles that underlie agriculture rather than giving instruction in the details of farming, (2) securing the sympathetic cooperation of parents on the basis of "a declaration of dependence," and (3) avoiding the attitude of authority and dogmatism.

Community work in the one-teacher rural school, B. H. Crocheron (pp. 280–284).—The fundamental thought in this address appears in the following quotation: "The rural school must feel that its work lies above and beyond the children; that the education of the whole community is its sphere; and that the building in which the day classes meet is fulfilling but a small part of its use if its windows remain dark every night while the people suffer for a common place of meeting and a common plane of thought on which to meet." Among the usable forms of school community work are suggested seed, plant, and milk testing, children's clubs, women's meetings, farmers' meetings, literary societies, field days, corn, potato, and fruit shows, and the like. "The surest way to better the school is to improve the neighborhood about it." The great danger is that teachers who inaugurate such work will too soon be promoted away from it to larger fields.

Connecting public school agriculture with the business of farming, D. J. Crosby (pp. 303–306).—The author quotes former President Eliot of Harvard University to the effect that many children leave school early because the grammar and high school grades do not furnish a life motive for study. He proceeds to describe how such interest is aroused in the teaching of school agriculture so as to connect it with work on the farm and in the home, by referring to the work of typical agricultural schools. He believes that "there is nothing inconsistent in hoping eventually for a course of study which shall be pedagogically sound and economically useful."

The development of agricultural teaching in Virginia, K. C. Davis (pp. 309, 310).—This address emphasizes the fact, and its significance, that the number of teachers studying agriculture in the Summer School of the University of Virginia increased from less than a score in 1907 to nearly 300 in 1910.

Papers on Domestic Science in Rural Schools, by Miss Neale S. Knowles, Boys' Corn Clubs, by I. O. Schaub, and The Agricultural High School, by W. H. Hand, were also presented.

Suggestions for organizing a high school course in agriculture, G. A. Bricker (*Agr. Col. Ext. Bul. [Ohio State Univ.], 6 (1910), No. 1, Sup. 2, pp. 16, figs. 13*).—This publication discusses the nature of agriculture as a school study, the necessary equipment for studies of plants, animals, farm machinery, and soils, the seasonable sequence of illustrative materials, and the importance of treating agriculture as a distinct subject. It includes a list of text-books and helpful bulletins.

Exercises in elementary agriculture, G. A. Bricker (*Agr. Col. Ext. Bul. [Ohio State Univ.], 6 (1910), No. 1, Sup. 1, pp. 7*).—This publication includes 4 school exercises, on root tubercles, collecting and mounting tubercles, the retention of moisture by means of the skin of a potato, and the adulteration of seeds, respectively, together with a brief discussion of the demonstration, practicum, verification, and experiment, as distinct forms of agricultural study.

School exercises in plant production, D. J. Crosby (*U. S. Dept. Agr., Farmers' Bul. 408, pp. 48, figs. 39*).—This bulletin is a revision and enlargement of the major part of Bulletin 186 of this Office, previously noted (E. S. R., 19, p. 91). There is added a list of helps for teachers, this including a number of books on rural school agriculture and a list of state institutions that have issued pamphlets containing exercises in public school agriculture.

School lessons on corn, D. J. Crosby and F. W. Howe (*U. S. Dept. Agr., Farmers' Bul. 409, pp. 29, figs. 12*).—This bulletin includes a revision of a portion of Bulletin 186 of this Office (E. S. R., 19, p. 91) and a reprint of Circular 96 (E. S. R., 23, p. 195). An additional exercise is given on simple corn breeding experiments that can be conducted in a school or home garden, and a list of publications on various phases of corn production.

The story of a king and queen (*Illinois Sta. Circ. 145, pp. 16, figs. 4*).—This is a story of corn and clover to show some of the results obtained by the Illinois Station in soil improvement through the use of phosphoric acid, lime, and crop rotation.

Some Minnesota insects and useful birds, F. L. Washburn (*Minnesota Sta. Wall Chart and Sup. Circ., pp. 6*).—A large chart mounted on linen, showing the principal economic birds and insects in Minnesota in colors has been prepared by the state entomologist for distribution to Minnesota schools. The circular gives brief descriptions of the illustrations on the chart.

Improving school grounds, R. S. MACKINTOSH and P. F. WILLIAMS (*Bul. Ala. Polytech. Inst., 4 (1909), No. 2, pp. 3–25, figs. 7, dgms. 8*).—Suggestions are given for the planning and planting of school grounds, including several sketch plans for grounds of various areas and notes on the leading desirable trees and shrubs.

Proceedings of the twenty-third annual convention of the Association of American Agricultural Colleges and Experiment Stations, held at Portland, Oreg., August 18–20, 1909, edited by A. C. TRUE, W. H. BEAL, and W. O. THOMPSON (*U. S. Dept. Agr., Office Expt. Stas. Bul. 228, pp. 124*).—An account of this convention has been given (E. S. R., 21, p. 506).

Announcement of farmers' short courses in animal industry and veterinary science at the University Farm, Davis, Cal. (*California Sta. Circ. 57, pp. 13, pl. 1, figs. 3*).—An outline is given of the short courses in animal industry and veterinary science held from October 17 to November 4, 1910.

MISCELLANEOUS.

Twentieth Annual Report of Tennessee Station, 1907 (*Tennessee Sta. Rpt. 1907, pp. 5–16, fig. 1*).—This contains the organization list, reports of the director and heads of departments, and a financial statement for the fiscal year ended June 30, 1907.

Twenty-first Annual Report of Tennessee Station, 1908 (*Tennessee Sta. Rpt. 1908, pp. 109–128, fig. 1*).—This contains the organization list, reports of the director and heads of departments, a list of the publications available for distribution, and a financial statement for the fiscal year ended June 30, 1908. A report of experiments in beef feeding is abstracted on page 71 of this issue, and work in dairy feeding has been previously noted from another source (E. S. R., 20, p. 672).

Twenty-second Annual Report of Tennessee Station, 1909 (*Tennessee Sta. Rpt. 1909, pp. 93–116, figs. 3, charts 2*).—This contains the organization list, reports of the director and heads of departments, and a financial statement for the fiscal year ended June 30, 1909. The experimental work reported is for the most part abstracted elsewhere in this issue.

Information on work of Purdue Experiment Station and School of Agriculture (*Indiana Sta. Circ. 24, pp. 48, figs. 43*).—This circular contains a brief outline of the work of the various departments of the station and school of agriculture, and of the recent publications of the station available for distribution.

Experiment Station Work, LVIII, LIX (*U. S. Dept. Agr., Farmers' Buls. 412, pp. 32, figs. 6; 419, pp. 24, figs. 4*).—These numbers contain articles on the following subjects:

No. LVIII.—Fertilizers for pineapples, wart diseases of the potato, the typhoid or house fly, rice and its by-products as feeding stuffs, the forced molting of fowls, a portable panel fence, pasteurization in butter making, and milling and baking tests with durum wheat.

No. LIX.—Tillage *v.* sod mulch in apple orchards, ear characters of seed corn in relation to yield, seed disinfection and crop production, blackleg of the Irish potato, progress in horse breeding, and sweet potatoes and their preparation for the table.

NOTES.

California University and Station.—H. A. Hopper, assistant professor of dairy husbandry and assistant dairy husbandman, has resigned to engage in farming, as has also Roscoe Farrar, instructor in soils and farm crops at Davis. Both resignations became effective January 1.

Connecticut State Station.—Owen Nolan has been appointed a chemist in the station.

Maine University and Station.—J. R. Dyce has resigned as instructor in animal husbandry to become instructor in animal husbandry at the New York State School of Agriculture at Morrisville, N. Y., and has been succeeded by R. W. Redman, dairy instructor in the state department of agriculture. Raymond P. Norton has resigned as assistant chemist in the station to accept a similar position in the Dairy Division of this Department.

Massachusetts College.—The dedication of the new building for entomology, zoology, and geology took place November 11. The dedicatory address was delivered by Dr. L. O. Howard, of the Bureau of Entomology of this Department, and Dr. W. E. Hinds, of the Alabama College and Station, presented a brief history of entomological instruction at the college.

The building is an imposing structure of colonial design, 100 by 120 ft. in dimensions, and constructed of brick, steel, and concrete. A basement contains spacious laboratories for geology and mineralogy, a rock museum, a laboratory for insecticide analysis, and two rooms for spraying apparatus. On the main floors are departmental offices and laboratories, a zoological museum, an insect collection room, a library, a large amphitheater lecture hall, and smaller class rooms. A greenhouse for experimental work in entomology is attached. The entire cost, including equipment, was about $95,000.

Michigan Station.—G. Herbert Coons, adjunct professor of agricultural botany at the Nebraska University and Station, has been appointed research assistant in plant pathology. Joseph A. Rosen has been appointed research assistant in soil physics.

Mississippi College.—Daniel Scoates, who has been in charge of irrigation works at the Montana Station, has accepted the professorship of agricultural engineering.

Cornell University.—Three additional fellowships are announced in the college of agriculture. One of these is for the investigation of the effect of cement dust on the setting of fruit, and another for the investigation of the nature and control of the diseases of orchard crops, especially the New York apple tree canker. The third fellowship, for the investigation of the nature and control of the fungus diseases and insect pests of orchard crops near Batavia, carries an appropriation for two fellows, one in the department of plant pathology and the other in the department of entomology. The first of the three fellowships was established by private gift, and the remainder by the fruit growers' associations of South Byron and Batavia, respectively.

Ohio Station.—Ross Sherwood, a graduate of the Iowa College, has been appointed assistant in animal husbandry in charge of poultry investigations.

Pennsylvania College.—B. O. Severson (University of Wisconsin, 1910) has accepted an instructorship in animal husbandry.

Vermont University.—Dr. Matthew Henry Buckham, president of the university since 1871, died November 29, after a brief illness.

President Buckham was born in England July 4, 1832, coming to this country two years later. He was graduated from the University of Vermont in 1851, receiving the highest honors in his class.

Aside from two years as the principal of Lenox Academy in Massachusetts and a like period of study in Europe, the succeeding 59 years of his life were spent in the service of the university, first as tutor in languages, later as professor of Greek, for a time as professor of rhetoric and English literature, and for nearly 40 years as president. During his administration the university buildings increased in number from 6 to 25, the faculty from 14 to 80, and the students reached a total of over 500.

In addition to his work as an administrator and educator, President Buckham's services were much in demand as an orator on formal occasions of a public nature. Among the more noteworthy of these addresses was the graceful and discriminating eulogy before the Association of American Agricultural Colleges and Experiment Stations at its meeting in 1899, following the death of the late Senator Justin S. Morrill, with whose life and work he was very closely in touch. In the association itself President Buckham was for years a prominent figure, serving as president in 1906 and on the committee on graduate study since its establishment.

His long life was marked by many honors and the occupancy of a wide range of positions of trust. Both Dartmouth and Hamilton colleges conferred upon him the degree of D. D. in 1877, and Middlebury, Dartmouth, and Wesleyan had each given him the degree of LL. D.

Wisconsin University.—Fire damaged the new greenhouses of the horticultural department November 21, causing a loss of about $2,000, and seriously delaying the use of the added facilities they were to provide.

Members of the faculties and graduate students of several colleges of the university have formed a breeders' club. A country life club has also been organized in the college of agriculture. The *Student Farmer*, the undergraduate agricultural publication, has been reorganized as the *Wisconsin Country Magazine*. It is expected to secure considerable practical training for the students in agricultural journalism in connection with the new form of publication.

American Association of Farmers' Institute Workers.—The fifteenth annual meeting of this association was held in Washington, D. C., November 14–16. There were 115 delegates registered, representing 37 States, the District of Columbia, and 3 of the Provinces of Canada.

Statistical reports as to the status of farmers' institutes, presented from 32 States and Territories of the United States and from 5 of the Canadian Provinces, showed a greatly increased attendance for the year. The total number of sessions of regular institutes held was 20,956, and the attendance at these sessions was 2,296,517, an average of 109.5 per session.

The president of the association, G. A. Putnam of Toronto, summarized in his address the work of the farmers' institutes as having three general purposes: (1) Increasing production; (2) securing a better home and community life in the rural districts, and (3) lessening the wide margin that now exists between the prices received by the producer and those paid by the consumer. He stated that investigations show the farmer's share of the consumer's dollar to be about thirty-five cents. Consequently the increased cost of living is not due to the high prices paid the farmer, but the remedy is to bring the producer and the consumer more closely together. As a means to this end, organization and cooperation were emphasized.

In the reports of the standing committees, which are rapidly coming to be an important feature of the association, some of the remedies suggested for existing defects in institute work were securing more generally the organization of local institute societies to take charge of the institutes in the several counties, the more careful selection of institute lecturers, the equipping and sending out of movable schools of agriculture, and establishing and conducting institutes for women and for young people.

A paper by Hon. C. C. James, Deputy Minister of Agriculture for Ontario, upon The Problem of the Indifferent Farmer, was one of the most suggestive offered. The indifferent farmer, by reason of his number and possibilities, was characterized as one of the greatest potential assets of the country, and it was stated that no work that this country can engage in promises larger returns than stimulating and helping him to better ways and better living. There must first be increased agricultural production, but with this should come financial prosperity, and, as a result, better schools, better roads, the beautifying of homes, increased social advantages, quickened intelligence, and the general moral uplift of the community. The way to reach and influence the indifferent farmer, in his opinion, is through the agricultural missionary, a combination of agricultural teacher and representative of the state or provincial department of agriculture, who is an expert local adviser in rural affairs, living in the community and devoting himself to aiding indifferent farmers in their practice.

The value of this method of aiding rural people was also emphasized by Dr. G. C. Creelman, president of the Ontario Agricultural College, in a paper upon The Engaging of Experts to Organize Farmers' Clubs and to Establish and Oversee Demonstrations in Agriculture. Dr. Creelman gave the outlines of the plan previously described by him (E. S. R., 19, p. 899) of providing government experts for instruction in local schools with demonstration work among the community, and which is now in operation in 14 counties in Ontario. The plan has now been under trial three years and a half and the demand upon the government from other counties for such expert representatives is becoming very persistent. In the speaker's opinion it seems the best way yet devised for getting into immediate touch with the men on the land.

The association devoted one entire session to the discussion of institutes for young people and another to institutes for women. The topics considered in the young people's session were as to whether the time has arrived when institutes, as distinguished from boys' and girls' clubs, should be organized specially and separately for young people between the ages of 14 and 18, the plan to be adopted in such institutes, the objects desirable to attain, the kind of exercises and methods best suited for the purpose, and the desirable qualifications in the teachers. These topics were discussed by J. M. Stedman, of this Office, A. D. Wilson, of the University of Minnesota, Mrs. F. L. Stevens, of North Carolina, and F. H. Rankin, of Illinois.

Corresponding topics were discussed at the women's session, the speakers including Miss Jennie Buell, of Michigan, Miss Jennie C. Barlow, of Illinois, Mrs. H. J. Patterson, College Park, Md., Mrs. Henrietta Calvin, Lafayette, Ind., Mrs. Helen Wells, New York, and Miss Martha Van Rensselaer, of Cornell University. The fact was developed that institutes of this character are being successfully organized and held in a number of the States. The Province of Ontario remains, however, the most notable example presented of the general organization of women throughout a considerable area, the report of that

Province for the year giving the number of sessions of women's institutes at 5,483, and the attendance at 140,388.

One of the interesting features in the general session of the association was an address by P. C. Parks, of Clark University, South Atlanta, Ga., upon the condition of the negro farmers of the South. He pointed out the economic effects of inefficiency among the negro farm laborers, and that their lack of skill and knowledge of farming operations now seriously affect the prosperity of southern agriculture. Although largely engaged in farming, they are almost wholly without intelligent direction. Very few of them understand diversified farming, and they are also unable or unwilling to read the agricultural papers and magazines. None the less, these negro farm workers, he believed, were one of the most valuable potential assets of the South, and that their development is of exceedingly great importance, not only in the betterment of the social conditions that exist among the negroes themselves, but in the uplifting and improvement of the business of agriculture. He advised the organization in each State of a special department of farmers' institutes for negro farmers. Such an organization, he stated, would arouse interest in self-improvement, and while doing a great service to the race would be of practical usefulness in a financial way to the State. A resolution was adopted providing for an investigation of the general condition of the negro farmers of the South, the report to be presented at the next meeting of the association.

Other resolutions adopted by the association recommend the holding of experimental institutes for young people and that greater consideration be given in institute work to subjects relating to home life, either by special women's meetings or in the regular sessions. The employment of experts by the year to give personal instruction and demonstrations, organize farm clubs, etc., was indorsed. The desirability of offering in the Graduate School of Agriculture a course of instruction in institute and other forms of extension work was suggested.

The belief of the association in the importance of adequate appropriations for the farmers' institute work of this Office was again affirmed, as was also the position of the association with reference to federal legislation for extension work in agriculture. Granting the franking privilege for agricultural extension literature was advocated, as well as federal aid in the building of public roads.

The officers of the association chosen for the ensuing year are A. M. Soule, of the Georgia College, president; W. T. Clarke, of the University of California, vice president; John Hamilton of this Office, secretary-treasurer; and Val Keyser, of the University of Nebraska, Franklin Dye, secretary of the New Jersey State Board of Agriculture, and J. H. Miller, of the Kansas College, members of the executive committee.

Association of Official Seed Analysts.—The third annual meeting of this association was held in Washington, D. C., November 14 and 15, 1910. The program consisted of papers dealing with the results of studies on germination and seed structure and of conferences on methods and apparatus for seed testing and on seed legislation. The association adopted a constitution at this meeting and passed resolutions favoring the establishment of a journal of agricultural research for the publication of original technical reports of the scientific investigations made by the federal agricultural experiment stations, and the enactment of a national law to prevent the importation into the United States of agricultural seeds unfit for seeding purposes.

The officers elected for the ensuing year are: E. H. Jenkins, president; L. H. Pammel, vice-president; E. Brown, secretary; and H. L. Bolley and H. W. Barre, additional members of the executive committee. The committee on seed legislation for the year consists of C. D. Woods and L. H. Pammel. The committee on methods and apparatus was discontinued and the following referees were appointed to take its place: C. D. Woods, on methods of sampling, E. Brown, on methods of testing for germination, and H. Garman, on methods of testing for purity.

Association of Feed Control Officials.—The second annual meeting of the Association of Feed Control Officials of the United States was held in Washington, D. C., November 14–16, 1910.

The address of the president of the association, B. L. Purcell of Virginia, dwelt on the importance of the organization as a means of uniting the varied interests for enacting and enforcing uniform and just laws relating to the manufacture and sale of feeding stuffs. Other addresses were made by H. W. Wiley, of this Department, on the Importance of Making Feed out of Sound Material; C. D. Woods, Director of the Maine Station, on the Cooperation between Feed Dealer and Executive of the Law; and R. W. Chapin of Buffalo, N. Y., on The Manufacturers' Position and Needs.

The principal business of the meeting was the adoption of a draft of a uniform state feeding stuff law recommended by the executive committee after a discussion by feeders, feed manufacturers, representatives of trade associations, and feed inspection officials. A list of definitions of terms used to describe by-products used as feeding stuffs for live stock was also discussed and adopted.

The officers elected for the coming year were L. F. Brown, Albany, N. Y., president; W. F. Hand, Agricultural College, Mississippi, vice-president; J. D. Turner, Lexington, Ky., secretary-treasurer; and the president, secretary-treasurer, C. D. Woods, Orono, Me., J. K. Haywood of this Department, and W. J. Jones, jr., Lafayette, Ind., executive committee.

The First International Congress of Entomology.—The First International Congress of Entomology, which was held at Brussels during the summer, opened with an attendance of 292 entomologists. Prof. Lameere, president of the Entomological Society of Belgium, presided over the congress.

The subjects presented which relate to economic entomology include the following: The Invasions of Grasshoppers, their Destruction by Natural Causes and by Man, by M. J. Künchel d'Herculais; Artificial Distribution of Insect Pests and The Distribution of the Yellow Fever Mosquito, by F. V. Theobald; Notes on Lepidoptera Attacking Cotton and Methods for their Destruction, by A. Andres; *Galerucella lineola*, Coleopter, its Life History and Habits with Notes on Preventive and Remedial Researches, by R. MacDougall; The Disinfection of Imported Seeds of Plants and the Use of Insecticides, including a graphic account of the progress of economic entomology in the West Indies and in India, by D. Morris; Conference on Medical Entomology, by R. Blanchard; Ants and their Guests, by E. Wasmann; The Destruction of Insects Injurious to Cultivated Plants, by V. Vermorel; Economical Questions in Bengal, by J. M. Howlett; Insects which Transmit Diseases, by A. Renard; Notes on the Œstridæ, including an account of experiments to elucidate the life history of *Hypoderma bovis* and the economic value of preventive treatment and observations on the warble fly of the reindeer (*Œdemagena tarandi*), by G. H. Carpenter; Cuticolous Diptera of the Bovidæ in the Congo, by L. Gedoelst; and Preliminary Notes and Information on *Sphenoptera lineata* and the Larva of a Lepidopter which Attack *Hedysarum coronarium* of Tunis and Sicily, by F. S. Perez.

The History of Entomology in Spain was presented by R. Garcia y Mercet, and The Dependence of the Fauna on the Soil (Influence of the Soil Constitution on Biogenetics and Geographic Distribution of Insects), by K. Holdhaus. Among those contributing to the sectional program were W. J. Holland of

Pittsburg and H. Skinner of Philadelphia, the latter of whom presented a paper on One Hundred Years of Entomology in the United States of America.

The second meeting of the congress will be held at Oxford, England, in 1912, with E. B. Poulton as president.

Fifth National Dairy Show.—The fifth National Dairy Show, held at the Coliseum Building, Chicago, Ill., October 20–29, 1910, provided a common meeting ground for teachers and investigators, practical farmers, users of milk, milk producers, and manufacturers of dairy products. As a means of furnishing illustrations for dairy farmers as to the importance of producing clean milk and for enlightening city dwellers as to the proper methods of handling milk and its products in the home, it had considerable educational value. As usual, all the prominent breeds of American dairy cattle were represented, and a demonstration herd was in charge of H. Rabild, of this department. I. C. Weld, also of this department, had charge of the cream and milk exhibit. There was a very large exhibit of machinery and supplies used in different lines of dairy husbandry and in the manufacture of dairy products.

Some of the novel features of the show were the baby-feeding exhibit, conducted by the Chicago Board of Health, showing mothers how to prepare and feed milk to babies, and a cooking-school demonstration, where dairy products were prepared. There were also other demonstrations of the best methods of handling cream and milk on the farm and in the home. A branch of the Chicago city laboratory illustrated methods of handling milk, and the Illinois Food and Dairy Commission showed how the pure-food laws relating to milk were enforced.

The intercollegiate student contest for judging dairy cattle was participated in by teams from the Kentucky, Missouri, Nebraska, Cornell, and Ohio State universities and from the Iowa and New Hampshire colleges. The highest total score for all breeds was made by the Cornell team, with Missouri second and Nebraska third. An innovation this year was the offering by the Jersey and Holstein breeders' associations of $400 scholarships to the students making the highest scores for their respective breeds, Ivan McKillip, of the University of Nebraska, winning that for Jerseys and T. B. McNath, of the University of Missouri, that for Holsteins.

In connection with the show meetings of a number of cattle clubs and local dairy associations were held, besides a number of national organizations. College and department officers were well represented at these meetings. H. Rabild was elected secretary-treasurer of the American Dairy Farmers' Association, and Dean J. L. Hills, of the University of Vermont, W. J. Fraser, of the University of Illinois, and L. S. Merrill, of the University of Maine, members of the board of directors. B. D. White, of this department, was elected secretary of the International Milk Dealers' Association. The National Dairy Show itself is held under the auspices of the National Dairy Show Association, of which H. E. Van Norman, of the Pennsylvania College, is secretary and manager.

Official Dairy Instructors' Association.—The fifth annual conference of the Official Dairy Instructors' Association was held in connection with the National Dairy Show, Chicago, Ill., October 24 and 25, 1910. The principal papers read were on Future Work of the Association, by C. H. Eckles, of Missouri, president of the association; What Can the Agricultural College Do to Assist the Farmers in Planning Sanitary Barns and Buildings? by O. Erf, of Ohio; Organization of Breeding Centers, by A. C. Anderson, of Michigan; and Training Men for College and Experiment Station Work, by W. A. Stocking, jr., of Cornell University. In these papers and in the reports of various committees the need was emphasized for better trained teachers and investigators in dairying, and for efficient extension workers among the dairy farmers.

The officers elected for the ensuing year were O. F. Hunziker, of Purdue University, president; W. J. Fraser, of the University of Illinois, vice-president; and W. A. Stocking, jr., secretary-treasurer.

New England Intercollegiate Judging Contests.—A stock judging contest was recently held in connection with the Brockton (Mass.) fair in which teams participated from the Massachusetts and New Hampshire colleges and the Maine and Vermont universities. Fruit judging and fruit packing contests formed a feature of the fruit show at Manchester, N. H., the institutions here represented by teams of students being the Connecticut, Massachusetts, and New Hampshire colleges and the Maine University. The Massachusetts Agricultural College team won first place in both contests at Manchester and in that at Brockton.

Necrology.—Dr. David P. Penhallow, professor of botany at McGill University since 1883, died October 30 at the age of fifty-six years. He was a graduate of the Massachusetts Agricultural College, and one of the group from that institution who helped to organize the Imperial College of Agriculture at Sapporo, Japan, about 1876. His botanical studies were especially devoted to the anatomy of woods, both recent and fossil, on which subject he published many papers and a work entitled Gymnosperms, which appeared in 1908. At the time of his death he was president of the American Society of Naturalists and vice-president of the American Society of Botanists.

Jakob Maarten van Bemmelen, the distinguished Dutch agricultural chemist, died November 3 at the age of eighty years. He had made many valuable contributions to the knowledge of soils, especially those of Holland and the Dutch Colonies. One of his most important works was Die Absorptions verbindungen und das Absorptions vermögen des Ackererde, which appeared first in *Die Landwirtschaftlichen Versuchs-Stationen* and forms an important chapter in the collected work of the author on colloids and absorption which was published at Dresden in 1910, under the title of Die Absorption, and makes a book of over 550 pages.

Prosper J. A. Berckmans, the well-known nurseryman and one of the pioneers of American horticulture, died November 8 after a short illness, in his eighty-first year. Although not a prolific writer, he was intimately connected with the leading horticultural societies, both in this country and in Europe. He had served for many years as president of the American Pomological Society, and was considered an authority on pomology and ornamental horticulture.

W. R. Fisher, assistant professor of forestry at Oxford University and a frequent contributor to the literature of British forestry, died November 13. His more prominent works are Forest Protection and Forest Utilization, which constitute volumes four and five of Schlich's Manual of Forestry.

Dr. M. Treub, director of the Botanical Garden at Buitenzorg, Java, from 1880 to 1909, died October 3, 1910. Dr. Treub is known among plant physiologists for his discovery of hydrocyanic acid in *Pangium edule*, and the theory of that substance as the first synthetic product in the formation of nitrogenous materials in plants.

A drinking fountain has been erected at the Central Experimental Farm at Ottawa in memory of the late Dr. James Fletcher, former Dominion entomologist and botanist.

O

EXPERIMENT STATION RECORD.

CONTENTS OF VOL. XXIV, NO. 2.

SUBJECT LIST OF ABSTRACTS.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

METEOROLOGY—WATER.

SOILS—FERTILIZERS.

AGRICULTURAL BOTANY.

FIELD CROPS.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

FOODS—HUMAN NUTRITION.

ANIMAL PRODUCTION.

DAIRY FARMING—DAIRYING.

VETERINARY MEDICINE.

RURAL ECONOMICS.

AGRICULTURAL EDUCATION.

MISCELLANEOUS.

LIST OF EXPERIMENT STATION AND DEPARTMENT PUBLICATIONS REVIEWED.

NOTE.—The price of *Experiment Station Record* is $1 per volume, and two volumes are issued annually. It may be purchased from the Superintendent of Documents, Washington, D. C., to whom all remittances should be made. The publications of the state experiment stations are distributed from the stations and not from the Department.

EXPERIMENT STATION RECORD.

Vol. XXIV. February, 1911. No. 2.

Half a century ago engineering attracted little attention. Then only a small number of men followed this vocation, and there were few institutions which gave instruction in the subject. It was not until after the Civil War that men began to recognize the value of technical training and to question the wisdom of compelling all college students to spend so large a part of their time in a study of dead languages and a dead past. Then followed the passage of the Morrill Act, providing for colleges of agriculture and mechanic arts throughout the Union.

These institutions have been a great factor in the development of engineering education. In 1909 there were, according to the report of the Commissioner of Education, a total of 31,748 engineering students in all the universities, colleges, and technical schools of the United States. Of this total number, 17,892 were in the land-grant colleges. These and other data show that the land-grant colleges are training more than 56 per cent of all the engineering students of the Nation. A hasty glance through the list of courses of these institutions shows that nearly all of these students are classified under civil, mechanical, electrical, and mining, with a scattering pertaining to sanitary, structural, and other branches of engineering.

The main activities of the land-grant colleges are concentrated upon the training of civil, mechanical, electrical, and mining engineers, in competition with a large number of State universities and technical schools. In their efforts to train civil engineers for railway corporations, mechanical engineers for manufacturers, and hydro-electrical engineers for water companies, these institutions are neglecting to train men for the engineering work of the farm and the country. The movement in that direction dates back but a few years, and as yet only one of the 67 institutions, the Iowa State College, offers a degree in agricultural engineering. Departments of agricultural engineering and of farm mechanics have now been provided in about a dozen of the agricultural colleges, and the men in charge of these departments are illustrating by their work the importance of this subject as a branch of agricultural education. As yet, however, much remains to be done in the way of adequate provision for this subject and in a broader realization of its importance.

At the fourth annual meeting of the American Society of Agricultural Engineers, held at Purdue University during the holidays, Dr. Samuel Fortier, in charge of the irrigation work under this Office, presented a paper setting forth in a striking manner the scope of agricultural engineering and the demand for this kind of training.

Agricultural engineering as a teaching subject may be divided into six branches, three of which relate to the farm and three to agricultural communities. These are (1) farm machinery and farm motors, (2) farm structures, including rural architecture, (3) rural water supplies and sanitation, (4) public roads, (5) drainage, and (6) irrigation. One or more of these divisions is now taught in most of the land-grant colleges, but with a few exceptions they are mainly side issues to what is considered the more important work of training men to become professional engineers. The institutions of this class located in the West give instruction in irrigation as a part of the civil engineering course; those of the Mississippi Valley offer courses in farm machinery and farm motors, while the subject of roads and pavements is included in a large number of engineering courses, but chiefly from the standpoint of the municipal engineer. Rural water supplies, farm sanitation, and farm structures are for the most part overlooked.

An engineering course combining the course of farm machinery and farm motors as now given in the University of Nebraska and the Iowa Agricultural College, of irrigation as now given in the University of California and the Agricultural College of Colorado, of rural architecture and cement work as given in the University of Wisconsin, and of highway engineering as taught in the University of Kentucky, is in large degree lacking. That there is an urgent need for better and more general training for the engineering work of the farm and the country is evidenced by the large interests represented, and the relation of the subject to the health and comfort of country living and the business side of farming.

According to the report of the Secretary of Agriculture the crops of corn, cotton, wheat, and oats for the past season aggregate a value of nearly three and one-half billion dollars. All four are annual crops requiring the preparation of the soil and subsequent operations of seeding, cultivating, harvesting, and marketing. An attempt to estimate the large number of implements, machines, and motors required for a task of this magnitude brings some realization of what is annually expended by American farmers in the purchase and maintenance of this necessary equipment. The census of 1900 placed the value of farm implements and machinery at $761,000,000, and the annual expenditures for new equipment and new machines at over one hundred million. This was 10 years ago and since then not only the number of implements and machines but more particularly the number of motors has been greatly increased.

The simple inexpensive implements used by our fathers have been for the most part replaced by more complicated and more expensive machines. Out of the hand flail of the fifties has been evolved the steam thresher of to-day. The modern harvester does the work of a large number of men, women, and children equipped only with the sickle, and motors, trolley cars, and railroads have relegated the saddlebags to the museum. These great changes during the lifetime of men still living, and more particularly the substitution during the past decade of motors for horses and mules, have created a widespread demand for young men possessing a knowledge of agricultural machines and the principles which underlie their construction and use. Studies of this subject are now as essential to the ambitious farm boy as anatomy is to the embryo doctor. The simple arts of mending a flail, whetting a scythe, or harnessing a team have grown into a complicated business demanding not only experience and skill but special training as well.

Nearly 50 years ago the Nation provided for instruction of a kind suitable to the boys and girls on the farm, but the millions of poorly designed farm homes which still mar the landscape are mute evidences that the instruction given did not include rural architecture. The improvement in farm buildings so urgently needed does not call for money so much as a knowledge of how to do things. Out of the same materials, and with very little extra labor, may be built a pleasant, convenient, healthy, and durable country residence, or the reverse. The main difference is one of plan and execution.

Some colleges now give instruction in rural architecture, others in farm architecture, and still others in cement and concrete. But these courses too often deal with urban rather than rural conditions. Undergraduates who are taught to design and supervise the erection of the palatial homes of the rich find the city and its suburbs the most convenient place to practice their profession. The contrast between rural and urban residences is still more strongly emphasized in relation to the water supplies and sanitation of each. Skilled engineers are employed to provide an ample supply of water for cities, and equally skilled biologists determine its purity, while but little attention is given to farm water supplies and sanitation. Most of the laborious work which falls to the lot of farmers' wives and daughters is due to the lack of proper facilities for providing a plentiful supply of fresh water and for removing the waste.

Farmers procure water for their needs from the same sources which supply water to the residents of cities. These are springs, wells, cisterns, reservoirs, lakes, and rivers; but the training and experience necessary to utilize such sources for the benefit of the one class differ in many essentials from those of the other. The civil engineer may succeed in building a distributing reservoir for a city and yet fail in his effort to build a cistern for a farmer. His computations for a high water tower may be correct and those for a windmill wholly wrong in principle. It is true both belong to hydraulic engineering; but so long as engineers are trained to solve the problems of the city and to neglect those of the country, we need not expect a high class of engineering on the farm.

Farm sanitation is of even greater importance, for on it depends in no small degree the health of the farmer and his family, and to a less extent that of the dweller in cities. The milk can washed in polluted water from the farm well may carry disease to thousands.

The farm water supplies in one State have recently been investigated by Kellerman and Whittaker, of this Department, in cooperation with the board of health of the State in question. Out of 79 carefully selected and typical rural water supplies, 20 were found to be good and 59 were polluted, the chief cause of the pollution being carelessness or ignorant management. Twenty-three of the farms examined showed a record of typhoid fever. The conclusion is reached that both farm and city are suffering from the careless management of rural sanitation. The improvement of these conditions is a comparatively simple matter, when the sources and danger of infection are realized and the means of avoiding them are intelligently understood.

According to statistics gathered by the Office of Public Roads of this Department, there are in this country about 2,151,570 miles of roads. Of this mileage only 176,429 miles are improved, or 8.2 per cent of the total. The improved portions are classified as those surfaced with gravel, with stone, or with special material.

The most striking feature of these statistics is the enormous extent of unimproved roads in the United States. An expenditure of something like $3,000,000,000 would be required to convert the common earth roads of the country into even good gravel roads. That this is desirable few will gainsay, and that it is becoming necessary under modern conditions and the relations now existing between producer and consumer is also quite generally admitted. The increased cost of hauling over unimproved roads is an immense tax upon the farmer and those who purchase his products, and is a restriction on the crops which can be raised and moved in certain localities.

The Interstate Commerce Commission finds that 265,000,000 tons of agricultural, forest, and miscellaneous products of the land are hauled to depots for shipment in the course of a year. Figured on the basis of the average haul and at the lowest average rate over unimproved roads. 23 cents per ton per mile, the cost would be $432,400,000. If the cost of hauling can be reduced to one-half the present average, or 11½ cents a ton, the resultant saving would exceed $200,000,000 a year. That such a saving is reasonable is indicated by the experiences in other countries and in localities where improved roads are found. The cost of hauling on such improved roads is placed at from 8 to 10 cents per ton. The introduction of wise and equitable road laws and good business management would, it is estimated, save $40,000,000 more in the administration of the country's roads or leave it for more advantageous use.

The rapid increase in urban population has greatly multiplied the demand for the perishable products of the dairy, truck farm, and orchard, and the value of such products depends to a large extent on their speedy transportation from the country to the city. For this and other reasons the auto truck and similar product-carrying motors are taking the place of the horse and cart and the farm wagon. Public sentiment in favor of better roads is rapidly spreading to each farm and hamlet. As a result of this awakening, our 2,000,000 miles of earth roads can not much longer remain in their present condition. American farmers can not afford to pay on an average 23 cents to haul a ton a mile when 10 cents would suffice if the highways were improved.

In casting about for ways and means to bring about a change, one of the vexing problems is the honest and efficient expenditure of road funds. The States which have decided in favor of better roads would receive much more benefit from their expenditure if the agricultural colleges had seen fit to establish good courses in highway engineering. The main purpose of such instruction at present is evidently designed for the benefit of the municipal engineer in the construction of city streets and pavements, since the time given to the subject is inadequate for a comprehensive study of both city streets and country roads.

In 1903 a committee on rural engineering, appointed by the Association of American Agricultural Colleges and Experiment Stations, submitted a report in which it pointed out that "the marsh and overflowed lands along our seacoast and the bottom lands bordering many of our rivers are at present unsightly, unproductive, and in some instances a menace to the health of surrounding districts. They need only to be diked and drained to be the most valuable lands in the country. The carrying out of these improvements will add immensely to the agricultural values of the country and the work is certain to be undertaken in the near future. It involves, however, a larger knowledge of agricultural engineering than can now be obtained in our land-grant colleges. In fact, the profession of agricultural engineer, so prominent in Europe, is almost unknown in this country."

Since the above was written Mr. C. G. Elliott, chief of drainage investigations in this Office, has submitted a report to Congress on the unreclaimed, swamp, overflowed, and wet lands of the United States. He estimates the extent of the permanent swamp land at 52,665,020 acres, of wet grass lands at 6,826,019 acres, of periodically overflowed lands at 14,747,805 acres, of periodically swampy lands at 4,766,179 acres, and of occupied farm lands needing drainage at 150,000,000 acres, a total of 229,005,023 acres.

The drainage of these lands is a matter of public health, and the benefits to agriculture are placed so high in the millions as to be well-nigh incomprehensible. Perhaps the most surprising thing about this inquiry is that each State in the Union is in need of drainage. The figures giving the total extent, exclusive of occupied farm lands, vary all the way from 8,000 acres in Rhode Island to nearly 20,000,000 acres in Florida.

Of even greater importance is the subject of irrigation. Two-fifths of the United States is arid and the remaining three-fifths, although humid, is subject to periodical droughts during which crop failures can only be averted by artificial watering. In the past 10 years nearly 16,000,000 people have been added to our population. The public lands suitable for cultivation in their natural state have been taken up, and the farms for the future millions must be wrested from the desert by irrigation or from the swamps by drainage.

About 13,000,000 acres of desert land have been reclaimed. The water which is applied to this area each crop-growing season would cover the whole of New England to a depth of 15 inches. The handling of this enormous volume, its distribution over widely scattered areas, and the preparation of the surface of fields so that water may be spread evenly over them, call for an amount of experience and skill not equaled in any other branch of agriculture.

Western farmers deserve great credit for the lands they have reclaimed, but their task is not completed. So great is the waste of water at present that from 50 to 100 per cent more land might be reclaimed if the waste waters were saved and utilized. It is, however, doubtful if the farmers will accomplish this reform by their unaided efforts. They have gone about as far as they can without the assistance and supervision of the trained specialist.

All over the irrigated West from every district and from nearly every farm, and also from the drought-stricken States of the East and Middle East, comes the call for help. How shall I line my ditch to prevent loss from seepage; how much water is needed for this and that crop, and when should it be applied; how shall I prepare my fields so that the ditch water will moisten the soil uniformly; and what is the most suitable device for measuring water? In other instances information is wanted on the construction of reservoirs and tanks, the installation of pumps, the erection of windmills, and the drainage of seeped lands.

These calls for help come with every mail to both the Department of Agriculture and the agricultural colleges and experiment stations. Even in the West only a few of the agricultural colleges maintain strong departments in irrigation commensurate with the importance of the subject and its efficient investigation.

Taken as a whole, the land-grant colleges may be said to have expended little effort or money in training specialists for engineering work of agricultural communities. This is perhaps not strange, for in the past the demand for engineers has been largely in connection with municipal and development work. But the present interest in agricultural development, in making land more efficient in production, and in the improvement of rural conditions in a variety of directions, has opened the way for the agricultural engineer and calls for the adequate development of the subject at the agricultural colleges. The field is broadening year by year, and in many cases is already being occupied by men who have had no contact with agricultural conditions or problems.

Unless the curricula of the engineering courses of these institutions are modified there is certain to be overcrowding in the older branches of the engineering profession. Meanwhile progress in agriculture and the improvement of rural districts are being immeasurably retarded through the lack of competent agricultural engineers.

CONVENTION OF ASSOCIATION OF AMERICAN AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS, 1910.

The twenty-fourth annual convention of the Association of American Agricultural Colleges and Experiment Stations was held at Washington, D. C., November 16–18, 1910. It was unusually well attended, representatives being present from the agricultural colleges and experiment stations in all of the States and Territories except Idaho, Oklahoma, and Texas, as well as from the U. S. Department of Agriculture and the U. S. Bureau of Education. This convention was one of several of interest from the standpoint of agricultural education and research held in Washington about the same time. Accounts of some of these have already appeared in the January issue of the Record.

A varied and interesting program of papers, addresses, and reports bearing upon the organization and administration of college, station, and extension work was presented.

President W. J. Kerr, of the Oregon Agricultural College, who presided, set forth in a forceful address the substantial progress and creditable achievements of the agricultural colleges in the face of very great difficulties, and vigorously refuted recent criticisms of the work and position of these institutions.

President J. K. Patterson, of Kentucky, in an eloquent and scholarly address, presented in retrospect the industrial development and the progress in industrial education during the past fifty years.

Captain M. J. Lenihan, as the representative of the War Department, presented a paper in which he discussed the relations of that Department to the land-grant colleges, and emphasized the value of military instruction to the student, to the college, and to the Nation.

N. Kaumanns, German agricultural attaché to the United States, read a paper dealing with certain aspects of American agriculture as seen through German eyes. The executive committee was requested to arrange for the separate publication of this address.

Dr. A. C. True in his report as bibliographer dealt with agencies and methods now employed in the publication of the results of scientific research under official, semiofficial, and private auspices.

The report of the committee on graduate study, presented by H. P. Armsby, chairman, dealt mainly with the Graduate School of Agriculture held at the Iowa State College, July 4–29, a report of which was presented by A. C. True, dean of the school. This report showed a larger attendance (207) at Ames than at any previous session of the school, and an interest on the part of the students never before surpassed. A fuller account of the school has been given in a previous issue.[a] By increasing the annual dues of each college represented in the association to $50, the association made more definite and adequate provision for the maintenance of this school. The committee recommended that the fifth graduate school be held in 1912. In the committee's opinion the graduate school by stimulating advanced study will make it necessary for the agricultural colleges to differentiate more clearly between undergraduate and postgraduate work, and to provide more adequately for the latter. The committee has therefore undertaken to aid the U. S. Bureau of Education in its inquiry into the facilities for postgraduate work at the land-grant colleges.

Commissioner E. E. Brown, K. C. Babcock, and A. C. Monahan, of the U. S. Bureau of Education, explained to the convention the character of the new work in the field of higher education, especially as related to the land-grant colleges, which the Bureau proposes to take up under authority recently granted by Congress, and asked for the cooperation of the association in this work. One of the first lines to be entered upon is an inquiry into facilities for graduate study at land-grant colleges. A resolution approving the proposed work and favoring the enlargement of the Bureau of Education was adopted.

The report of the committee on instruction in agriculture, presented by A. C. True, chairman, outlined a college course in home economics, and stated that a secondary course in animal production was in press and would be issued as a circular of this Office.[b]

The discussion of questions relating to the organizing and conducting of extension work in agriculture was a prominent feature of the convention. The report of the committee on extension work, presented by K. L. Butterfield, chairman, was devoted to a discussion of the problems confronting extension work in agricultural colleges, notably those dealing with the need of largely increased funds for the purpose and the source from which these should be derived, definitions and nomenclature relating to extension work, the types of work to be undertaken, the forms of administrative organization, the training requisite for workers, and the problem of social leadership. As a supplement to the report, detailed data compiled by John Hamilton of this Office, as to the present status of extension work in the United States, were submitted. These showed that 32 States and Territories now have complete or partially complete organizations for the purpose, and that the revenue in 29 States for the fiscal year ended June 30, 1910, aggregated $447,110.92. With reference to the method of organization, the committee favored in general the plan whereby the work is performed by a director or superintendent of extension work,

[a] E. S. R., 23, p. 402.

[b] U. S. Dept. Agr., Office Expt. Stas. Circ. 100.

responsible directly to the head of the agricultural work of the institution, and a corps of workers made up in part of men giving practically all their time to extension teaching and in part of the regular college and station staff.

A round-table conference led by W. E. Stone and A. M. Soule, on national aid to extension work and secondary vocational education, followed the presentation of the report. After earnest discussion of the matter the association reaffirmed its approval of national aid to extension work and requested the executive committee to use all legitimate means to secure such aid, but declined to make any formal expression of views regarding pending legislation providing for national aid to secondary vocational education. Later, however, this matter was referred to the newly established standing committee on college organization and policy for investigation and report at the next convention.

The question of charging a fee to nonresident students was discussed at one session of the convention and a diversity of practice in this respect was developed. Chancellor Samuel Avery, of Nebraska, thought no fee should be charged. President Stone, of Indiana, and Dean Russell, of Wisconsin, agreed with this position in theory, but thought a fee necessary to equalize burdens between resident and nonresident students and to protect the college. Apparently foreign students are not as a rule charged a fee by the institutions represented in the association.

In a brief report presented by the chairman, C. D. Woods, the committee on station organization and policy declared for a high standard for research work and for the sharp differentiation of such work from other station activities. This report was referred to in the previous issue.[a]

The executive committee was instructed to consider the feasibility of holding the next convention in connection with the meetings of various affiliated societies, and to take steps to arrange for the semicentennial celebration in 1912 authorized by the Washington convention in 1908.

Dr. True submitted a brief report of progress from the committee having the history of agricultural education in charge, and the committee was again continued.

Officers were chosen for the ensuing year as follows: President, W. H. Jordan, of New York; vice presidents, E. W. Allen, of Washington, D. C.; J. H. Miller, of Kansas; E. D. Sanderson, of West Virginia; G. I. Christie, of Indiana; J. F. Duggar, of Alabama; secretary-treasurer, J. L. Hills, of Vermont; bibliographer, A. C. True, of Washington, D. C.; executive committee, W. O. Thompson, of

[a] E. S. R., 24, p. 7.

Ohio; E. E. Sparks, of Pennsylvania; D. H. Hill, of North Carolina; W. H. Jordan, of New York; and C. F. Curtiss, of Iowa.

The vacancies occurring in the standing committees were filled as follows: Committee on instruction in agriculture, H. J. Waters, of Kansas, and H. C. White, of Georgia; committee on graduate study, H. J. Webber, of New York, and E. Davenport, of Illinois; committee on extension work, W. C. Latta, of Indiana, and C. F. Curtiss, of Iowa; and committee on experiment station organization and policy, C. E. Thorne, of Ohio (for two years), H. J. Wheeler, of Rhode Island, and E. B. Voorhees, of New Jersey. The personnel of the new committee on college organization and policy will be as follows: For three years, W. E. Stone, of Indiana, chairman, and A. R. Hill, of Missouri; for two years, W. D. Gibbs, of New Hampshire, and J. M. Hamilton, of Montana; and for one year, S. Avery, of Nebraska, and J. C. Hardy, of Mississippi.

The following were chosen officers of sections: College section, W. D. Gibbs, of New Hampshire, chairman, and J. F. Duggar, of Alabama, secretary; station section, H. L. Russell, of Wisconsin, chairman, and W. H. Beal, of this Office, secretary; section on extension work, P. G. Holden, of Iowa, chairman, and Alva Agee, of Pennsylvania, secretary.

An invitation was extended by Dean Davenport to hold the next convention of the association at Urbana, Ill., in connection with the semicentennial celebration of the university.

SECTION ON COLLEGE WORK AND ADMINISTRATION.

The four topics discussed in this section were entrance requirements to college courses, correlation of secondary and short courses with the four years' course, a plan of university organization, and the administrative relations between the board of trustees, the college president, and the dean and director.

The first topic was discussed in a paper by H. J. Waters, who believed that as far as the quantity of work required—the number of units for college entrance—the land-grant colleges should follow the lead of other colleges, but as to the kind of work he would recommend a change. He pointed out that the college preparatory work now demanded is a serious burden on the country high school, owing to the increasing demand upon these schools for more practical courses—greater attention to agriculture, domestic science, and manual arts; and he recommended that the land-grant colleges offer liberal credits to vocational subjects for entrance to any college course. Consideration should be given, not only to the college courses, but also to the needs of the pupils in schools below college grade. For this reason courses should be encouraged in the seventh and eighth grades of the elementary schools, and in the first two years of the high school to prepare pupils for life work.

D. H. Hill thought it is not entirely a question of what preparation the college would like to have its entering pupils receive, but what the high schools are prepared to do. He believed that for a time the colleges must accept an approximation of what might be considered the ideal college entrance preparation, and that possibly it might be well to admit students to the agricultural courses on a lower basis than to the engineering and other more technical courses, owing to the fact that the country schools are not as well prepared to give college entrance work as the city schools, and to his belief that young men coming from the country are able to work harder than those coming from the city and thus to reach the bachelor's degree standard in four years even if they start with a lower grade than do the city boys.

The paper was further discussed by Brown Ayres, who emphasized the desirability of getting students for the agricultural courses from classical preparatory schools; by W. M. Hays, who referred to the influence of the consolidated school in keeping students in school longer and thus giving them a greater amount of classical work; by Howard Edwards, who had found it desirable to give college credits for some high-school work in cases where students were able to present surplus units in one line of work and were deficient in others; and by A. R. Hill, who believed that when a young man is able to do college work he should be admitted without much reference to formal credits. President Hill also called attention to the fact that it is difficult to get high schools to present more than one year of well-taught agriculture for college entrance, and suggested that the agricultural colleges could aid the movement for the better teaching of agriculture in secondary schools by preparing outlines and helping to standardize the work in such schools.

A discussion of the correlation of secondary and short courses with the four years' course was presented in a paper by D. J. Crosby, who pointed out the fact that these courses were established primarily to prepare young men for the business of farming, and not for college entrance, but maintained that in all such courses opportunities for college entrance preparation should be afforded to students having the ambition, the intellectual qualifications, and the means to pursue a college course. For such students, he maintained, there should be no gap between the end of the secondary or short course and the college course, such as is found in schools offering a three-year severely technical agricultural course and an intermediate year of academic work for college entrance. He maintained also that schools having a six-months year should endeavor to provide their students with summer vacation problems to be worked out on the farm, to be regularly reported upon at the opening of the succeeding year, and to receive definite credits toward graduation. This would have the effect of standardizing work which is now done and for which there are no definite credits, and by reason of which the school suffers in comparison with other schools in presenting college entrance credits.

In his discussion of this paper, H. C. Price dealt with the public school secondary courses rather than the secondary schools maintained in connection with agricultural colleges, and stated that in the Ohio College of Agriculture it was the practice to make it more difficult for city boys to enter the college course than for country boys, this being accomplished by admitting country boys upon graduation from a three-year high-school course, while city boys coming from a four-year high-school course must present a certificate of graduation. He said that judging from three years' experience the college of agriculture had not suffered from such an arrangement. The purpose of the short courses in the college of agriculture, according to Dean Price, is to prepare for the business of farming, and such courses should not be combined with college preparatory courses.

W. M. Hays referred to the desirability of maintaining secondary courses, for a time at least, in every agricultural college to aid in the preparation of teachers of agriculture for lower schools.

A plan of university organization was discussed informally by A. R. Hill, who recommended (1) a small board of control, 7 to 9 members, to be appointed by the governor from both political parties, whose function should be to confirm the recommendations of the faculty and to lay down general rules under which the faculty may act freely; (2) a faculty consisting of a university faculty to pass legislation for all departments, special faculties of agriculture, law, medicine, etc., to have charge of admission, courses of study and regulations for graduation for their respective colleges, and a junior college faculty, the latter to consist of teachers of general courses for freshman and sophomore years; (3) in state universities an experiment station staff; (4) an extension staff with a permanent director and special faculty working as members of the different departments in the university. No graduate faculty should be provided for, such being an anomaly in a true university.

Dean Davenport discussed the administrative relations between the board of trustees, the college president, and the dean and director, He stated two theories with reference to the origin of authority in educational institutions, (1) that it is derived from one's immediate superior, and (2) that authority goes with ability and responsibility. He believed that the best organization includes a board of trustees to serve as a legislative body dealing largely with principles and little with details, and keeping the institution in close touch with public demands. The board should be a legislative body and should not be concerned with the execution of its laws.

The president of the college, being the highest executive officer of the institution, should be a strong man and should be made responsible for the execution of the regulations laid down by the board. He should be a clearing house of university affairs and the only official avenue of communication between the employees and the board, and in fulfilling this function should deal with each department as an administrative unit. The department, however, should not be the unit of work; the individual is the unit of work; and in small institutions there need be no intervening officer between the president and the corps of workers. If, however, the institution is large enough to be organized into colleges there should be not only departmental organization but departmental groups, presided over by deans or directors who should function as administrative clearing houses between the president and the heads of departments.

SECTION ON EXPERIMENT STATION WORK.

The subjects discussed in this section were Relation of the Experiment Station to Extension Work, and Adams Fund Investigations.

Discussing the first subject, E. Davenport referred to the great difficulty and importance of the question of organization and administration, and stated that he preferred the plan adopted in several States of organizing each department on the so-called three-legged basis—teaching, research, extension—making the subject-matter rather than the method of work the basis of organization. Extension work to be of most value to adult farmers should emanate directly from men of "the very best training, the highest experience, and the most intimate connection with the new knowledge that is possible of attainment."

C. E. Thorne discussed extension work strictly from the standpoint of a means of disseminating the results of research. He referred to the inadequacy of publications for this purpose even when printing is liberally provided for, as in his own case. He briefly described the extension work undertaken by the Ohio Station, including cooperative experiments, exhibits at agricultural fairs, and experiment farms in different parts of the State.

H. J. Webber stated that the organization advocated by Dean Davenport was in force at Cornell. He thought the extension worker should be to some extent at least an investigator, and that the investigator should come in contact more or less with practical farm problems and have "the inspiration of the farm."

W. H. Jordan thought it was "not necessary that you put a man on the soil in order that he may work out a truth tremendously important to agriculture." While he was heartily in favor of the men getting in touch with practical things, he was also in favor of the necessary seclusion of the investigator.

H. P. Armsby thought the question should be determined largely by the individuality of the man.

C. D. Woods thought the teacher would be benefited by engaging in investigation, but he did not think that except in rare instances the investigator was benefited by being taken away from investigation to do routine teaching or extension work.

R. W. Thatcher did not think it necessary or advisable for the investigator to go out frequently among farmers in order to find out what problems he must undertake. The investigator should not be required to perform a threefold function.

A. C. True thought the great difficulty in administering extension work was the inadequacy of force and funds. Interior teaching, exterior teaching, and research should be clearly differentiated. The man who discovers a new truth is not necessarily the only one who should be expected to disseminate it.

The Adams fund investigations were discussed under the threefold head of personnel; scope, purpose, plans; and records and reports, including publications.

C. D. Woods thought the Adams fund investigator should be a man who had done some independent research work, and had "ability to see problems" and to select and follow them to successful conclusion. The agricultural colleges are not now training many such men. When the right kind of man has been found it is very important to hold him. Opportunity for successful work is often more important than salary in doing this.

F. B. Mumford emphasized the importance of the agricultural colleges in encouraging research work by fellowships and like means. He thought it important that agricultural research should be done by men trained in agricultural courses. At present the best men are not always encouraged to go into advanced or research work, an opinion shared by J. L. Hills.

W. H. Jordan was of the opinion that the scarcity of trained men has led to a false opinion that young men can step speedily out of undergraduate work into important places. He believed some of the experiment stations were just as competent to give a man postgraduate work and fit him for investigation as the universities if he is the right sort of man. The stations must in many cases take inexperienced men and train them for the work.

J. H. Skinner spoke of the difficulty of holding the better men in investigation work because of higher salaries offered in other lines.

M. A. Scovell suggested that the kind of man selected would depend upon the problem. A graduate of an agricultural college would be best for certain lines of work, a university graduate for others.

The discussion of the second phase of the subject, viz, plan, purpose, and scope of Adams fund investigations, was led by E. W. Allen of this Office, who emphasized the importance of a definite aim or purpose and a well thought out plan of procedure. Mere accumulation of data, however valuable in itself, is not research but merely a means to that end. A carefully prepared plan is important from the standpoint of the administrative officer as well as that of the investigator. All projects should be so drawn up that the director can pass upon them intelligently and should be a matter of record in the director's office. The danger of undertaking projects too comprehensive in scope was pointed out, and typical examples of such projects were given. The projects should be carefully selected and closely supervised, especially at the outset.

J. G. Lipman urged that directors take a less local view of investigation and see that their men inform themselves as to the work of others along similar lines, and that when one station takes a man from another due notice be given so that the interests of the work may be safeguarded.

H. L. Bolley thought that administrative control might be too rigid and the lines of work too narrow for greatest efficiency. It is impossible, he maintained, to determine with positiveness in advance the course that investigation will take. Whether the plan will be broad or narrow depends upon the man.

H. J. Wheeler suggested that the men at the top are not paid enough to make research attractive as a career to young men. He would confine the work to a few projects. He thought the director should be in touch with all the work of all the departments of the station, but that the men should have full credit for their work.

Discussing the third phase of the subject, viz, records and reports, including publications, H. J. Wheeler urged the importance of comprehensive, complete, and permanent records of the experimental work. The original plan of investigations should be fully recorded. It should be insisted upon that all records are the property of the station and not of the individual, and notebooks and record books should be furnished by the station. The system of note taking and record keeping will vary widely with the man, and large individual freedom should be allowed in this matter; but he did not believe "that any man is fit to be director of an experiment station unless he knows beyond a question that the head of every department is keeping comprehensive, adequate notes that are permanent in character." The records should be preserved in fireproof safes or vaults.

SECTION ON EXTENSION WORK.

The sessions of this new section, provided by the association at its last convention, were of much interest in view of the present activity in extension work and the many problems it presents as to organization, methods, etc.

The present status of agricultural extension was discussed in a paper by K. L. Butterfield. It was shown that 35 colleges and experiment stations, representing 32 States and Territories, have now organized for agricultural extension work, the oldest dating back only to 1901, and only five extending back beyond 1906. There are now 113 persons regularly employed for the sole purpose of agricultural extension work.

The form or type of organization differs greatly in different States, and in some there is as yet no organization, the work being carried on by different members of the college or station staff independently of one another, and with no central coordinating or unifying control.

No common type of organization for extension work seems at present feasible in the several States, but the general concensus of opinion favors an organization which will be coordinate with interior instruction and research, and which will at the same time recognize and maintain departmental integrity in the institution as based on subject matter.

John Hamilton, of this Office, in continuing the discussion of this subject, showed the need of systematic methods of procedure in successful and permanent extension teaching, outlined the numerous activities involved, indicated a system of procedure embracing the complete organization of extension teaching, mapped out the field of work, gave the present financial resources for this activity in the United States, and spoke of the need of Federal appropriation. In 1910 there was appropriated by 25 States the sum of $286,950 for agricultural education extension, while receipts from other sources brought the total up to $447,110.92.

H. L. Russell emphasized the need of a clarification of the principles of organization in extension work, and supported the plan which correlates the extension work with that of research and interior teaching, and at the same time preserves departmental integrity. Some form of demonstration was conceded to be the best plan for reaching the persons most in need of assistance, and a concrete case was cited in regard to bovine tuberculosis.

The subject of extension schools was presented by E. A. Burnett, who held that the movable school is capable of adapting itself to a variety of conditions, and is especially applicable to the needs of advanced rural communities where a high order of systematic instruction is needed, or where special industries are being developed.

It should be a real serious school, and not a vaudeville meeting with a large enrollment as a factor to attain; and the time and place of holding the school should be in keeping with the subject under discussion in the region concerned. This latter is of great importance since a large part of the work of such schools should be field and demonstration work, and this must be conducted at the proper time and place for such work in regular farm practice.

T. A. Hoverstad called attention to the difficulty of getting farmers to thoroughly believe in the practicability of a demonstration conducted on station property, which difficulty was entirely removed by having the demonstration conducted on private farms, under the direction only of the station.

G. I. Christie maintained that movable schools, or short courses out over the State, are to be laid out according to local conditions in each State, and stated that in Indiana they are arranged according to districts.

That the good farmer will take care of himself, and that therefore efforts should be directed to the indifferent farmer, was brought out by C. H. Hinman, who also emphasized the value of demonstration farms in extension work, and the necessity of following up and keeping in touch with each individual.

If extension work in agriculture is to be of lasting and permanent good and result in a better agriculture and rural life, then it must be measured by the number of farmers who adopt improved methods as a result of this propaganda, and not by the mere number of persons attending an extension meeting which may be ever so interesting and popular and attract large crowds and still result in little or no change or improvement in farm practice in the region in which the meeting is held. A small number of persons permanently benefited in a large number of places is far better than a large number of persons in a few localities, even though equally benefited, because of the examples these people set in their communities.

The necessity of following up the extension work constantly, as a means of making it effective in its results, was emphasized by K. L. Hatch.

P. G. Holden pleaded for generosity and leniency toward one another's plan, especially in this plastic, formative stage of extension work, the differences being explained by the very different conditions in which each one is working; and he suggested the formation of a graduate school for instruction in extension work.

The training and preparation of extension teachers was outlined by A. C. True of this Office. Two divisions in the personnel were recognized, (1) the practical farmer who has made on the farm a success of some particular phase of agriculture and has developed a special ability as speaker and as writer, and (2) the college man whose scientific knowledge enables him to attack intelligently certain farm problems, and who shows ability to interest and instruct farmers through extension work. A combination of these two in one man would make the ideal extension instructor. As a training for extension teaching the practical farmer should pursue carefully planned reading courses and short courses in an agricultural college, and visit other regions; and the college man should devote a proportionate amount of time to actual farm practice. The summer vacation could be devoted to this purpose. The training of the younger generation for extension teaching should include, besides the regular college of agriculture courses, a year of postgraduate work in the extension department and a year of actual farm practice. The necessity for the extension man to be a true teacher and not an entertainer was emphasized. He should study the special needs of each community and visit a wide range of regions. Importance was also placed on studying the art of public speaking as well as pedagogics.

W. H. French maintained that agricultural extension is a part of our public education and should not be regarded or used as a means of advertising the college. The establishment of a system of consolidated rural schools, township high schools, and the introduction of agricultural courses in these and in the high schools already in existence he regarded as the greatest field for agricultural education extension at the present time. The extension instructor in these schools should also give regular instruction to the adult farmers in the neighborhood and conduct demonstration plats. A plea was made for the establishment in the agricultural colleges of courses especially planned to meet the needs of extension workers.

The necessity for extension workers to be true teachers and not entertainers was also emphasized by P. G. Holden. They should be consecrated to their work and they must know their people. The plan of cooperating with the public school system in agricultural extension work in Iowa was discussed in detail.

C. H. Tuck, in discussing the relation of extension work to rural schools in New York, recognized extension work as a part of the system of public education, and the rural-school problem as the greatest of the many that present themselves in the extension field, opening up the way for cooperating with all agencies, educators, societies, and State organizations, and the people as a whole.

D. J. Crosby, of this Office, pointed out the necessity for extension workers to encourage other agencies to pursue similar lines of work as local centers, and he illustrated the point by citing a concrete case in connection with a public school.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Introduction to colloid chemistry, V. Pöschl (*Einführung in die Kolloidchemie. Dresden, 1910, 2. enl. ed., pp. 68*).—A short text-book designed to serve as an introduction to colloid chemistry for the student, teacher, and factory superintendent.

About the use of Busch's nitron for the analysis of Chile saltpeter, L. Radlberger (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw., 39 (1910), No. 3, pp. 433–436, fig. 1*).—The results show that this method (E. S. R., 16, p. 945) is accurate when employed for estimating the nitric acid in Chile saltpeter providing the latter does not contain a large amount of perchlorates. A microphotograph of the precipitate is shown.

Determination of potassium as potassium platinic chlorid, P. Rohland (*Ztschr. Analyt. Chem., 49 (1910), No. 6, pp. 358–360*).—The author observed that barium chlorid is more easily soluble in methyl alcohol than in ethyl alcohol, and made use of this fact for the determination of potassium as potassium platinic chlorid in minerals, water, sulphates, etc. As the law of mass action shows that with analyses such as these an excess of barium chlorid must be employed, the chief advantage in using methyl alcohol lies in that in adding the barium chlorid (dropwise) the operator need not exercise extraordinary care. In this manner a pure potassium platinic chlorid is obtained, so that it is unnecessary to partially dissolve the salt, or to add a correction to the results of the analysis.

New methods for the analysis of commercial phosphates, J. M. Wilkie (*Jour. Soc. Chem. Indus., 29 (1910), No. 13, pp. 796–799*).—A discussion of various methods, with particular reference to that of the author (E. S. R., 21, p. 8).

Mechanical agitator for the analyses of phosphates, R. Frailong (*Ann. Chim. Analyt., 15 (1910), No. 6, pp. 228, 229, figs. 3*).—A description and illustration of the apparatus.

Contribution to the chemistry and analysis of fats, A. Heiduschka (*Ztschr. Angew. Chem., 23 (1910), No. 21, pp. 990–992*).—The results of tests with pure fatty acids or a mixture thereof are given, including the estimation of the Reichert-Meissl and Polenske figures, etc.

Micro-chemical reaction of fatty bodies and Gram's reaction, M. Guerbet, A. Mayer, and G. Schaeffer (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 8, pp. 353–356; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 4, p. 141*).—It was found that phosphatids, unsaturated fatty acids, and cerebrosids give Gram's reaction. From the results the author presents the hypothesis that bacteria only respond when they contain fat-like bodies.

The estimation of the volatile acids in fermentation products of some microbes by Duclaux's method, G. Seliber (*Abs. in Chem. Ztg., 34 (1910), No. 70, p. 622*).—The author states that determining the volatile acids affords an index as to the kind of organism present. Numerous tests were made with the butyric acid bacterium and the Duclaux method with very concordant results.

Lactose and its behavior in aqueous solutions, W. FLEISCHMANN and G. WIEGNER (*Jour. Landw., 58 (1910), No. 1, pp. 45–64, figs. 2; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 572, I, pp. 362, 363*).—"The specific gravity values obtained by Schmoeger for solutions of lactose up to 36 per cent and those given in the present paper for greater concentrations may be calculated as functions of the concentration x in weights per cent by the following formula: $D^{20}_{4} = 0.9982 + 3.7585x.10^{-3} + 1.1284x^2.10^{-5} + 5.8405x^3.10^{-8}$. The formula gives values for D up to 62.05 per cent of crystallized lactose. With concentrations of 11.96 per cent the D is correctly given by the first three members of the equation. The probable value for D of pure liquid lactose is $D^{20}_{4} = 1.5453$. When lactose is dissolved in water, a contraction, varying with the concentration, takes place, being greatest in solutions containing 54.03 per cent, in which the contraction amounts to 0.596 cc. in 100 gm. of solution. Assuming other constituents of milk to have no effect, the contraction in 100 gm. of average milk, due to lactose, will be 0.094 cc., and will vary between 0.077 and 0.116 cc. The results of calculations of the volume of milk from the sum of the volumes of the single constituents make it probable that the specific gravity of liquid proteins is about D^{15}_{15} 1.46."

Ferrocyanid of potash as an indicator in glucose estimation, E. SELVATICI (*Bul. Assoc. Chim. Sucr. et Distill., 27 (1910), No. 12, pp. 1179–1184*).—A quick and simple method is described as a substitute for the usual Fehling's method. The reagent employed consists of 15 gm. of potassium ferrocyanid dissolved in a liter of water, 10 cc. of which is mixed with 10 cc. of the Fehling's solution when required. The saccharine solutions are clarified with acetate of lead as usual.

Studies with the chlorophyll group.—About the formation of phyllotaonins from chlorophyllan, H. MALARSKI and L. MARCHLEWSKI (*Biochem. Ztschr., 28 (1910), No. 1, pp. 48–52*).—As the result of their work the authors state that by saponifying chlorophyllan a substance is obtained among the products which behaves optically as does allophyllotaonin. The authors will report later in regard to whether this body is identical with the one obtained from alkachlorophyll and zinc prophyllotaoninen. See also a previous note (E. S. R., 23, p. 708).

Presence of stachyose in the underground parts of labiate plants, L. PIAULT (*Jour. Pharm. et Chim., 7. ser., 1 (1910), No. 5, pp. 248–255; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 570, II, p. 336*).—"As the result of preliminary experiments on the action of invertase on extracts of a number of labiate plants, the author examined *Stachys lanata*, *S. sylvatica*, *S. recta*, *Origanum vulgare*, *Mentha sylvestris*, *Ballota fœtida*, *Clinopodium vulgare*, *Salvia splendens*, and *S. pratensis*, and isolated stachyose from each of these plants. The sugar was examined by the determintion of melting point, optical rotation, and water of crystallization in each case. Details of the method of extraction are given. By heating stachyose with a 2 per cent solution of sulphuric acid at 100° in closed tubes, levulose only is split off in the first 10 to 20 minutes."

The catalase of molds, A. W. DOX (*Jour. Amer. Chem. Soc., 32 (1910), No. 10, p. 1357–1361, fig. 1*).—"From the experiments described in this paper it is evident that molds contain the enzym catalase, first in the intracellular form, then gradually allow it to escape into the medium as an extracellular enzym. Just how this change is effected is not definitely known as yet, but it seems probable that some of the fungus cells undergo disintegration, or at least a loss of vitality, by which an opportunity is afforded the enzyms for diffusion or mechanical release into the medium."

About the fat-splitting ferments, G. HEFTER (*Österr. Chem. Ztg., 13 (1910), No. 11, pp. 134–137*).—A résumé of the theoretical and technical importance of lipolytic ferments.

About a new method of isolating peroxydases, A. W. VAN DER HAAR (*Ber. Deut. Chem. Gesell., 43 (1910), No. 8, pp. 1321–1327, figs. 3*).—A method claimed to be an improvement on Bach's method (E. S. R., 23, p. 210) is described.

Hedero-peroxydase, a gluco-proteid, A. W. VAN DER HAAR (*Ber. Deut. Chem. Gesell., 43 (1910) No. 8, pp. 1327–1329*).—Utilizing the above method with "hedera helix" and treating the resulting peroxydase with hydrochloric acid yielded a body reducing Fehling's solution and which was capable of yielding osazon. The author was not able to determine whether glucosamin was present, which might be produced by the hydrolysis of the gluco-proteid.

Studies on amylases. I, An examination of methods for the determination of diastatic power, H. C. SHERMAN, E. C. KENDALL, and E. D. CLARK (*Jour. Amer. Chem. Soc., 32 (1910), No. 9, pp. 1073–1086*).—The authors examined the various methods for estimating diastatic power, with a view to finding one which is reliable with amylases of various origins. The tests were conducted with pancreatin and taka-diastase.

Do grains killed by heat retain their diastatic power? J. APSIT and E. GAIN (*Compt. Rend. Soc. Biol., 67 (1909), No. 28, pp. 367–369; abs. in Chem. Abs., 4 (1910), No. 10, p. 1312*).—Grain heated for 20 minutes to a temperature of 65° C. and in water was found to be still capable of exerting its amylolytic action.

[Examination of barley] (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 2, Beilage, pp. 281–296, figs. 10*).—The official methods of the physical, physiological, and chemical examination of barley in Germany, under the food and condiment law are described.

The determination of nitrogen in dried unground cereals, F. J. ALWAY and E. S. BISHOP (*Nebraska Sta. Rpt. 1909, pp. 21–25*).—The method, while only approximate, has the advantage of not requiring the cereal to be ground for determining the moisture therein, and which thus makes it rapid of execution. It is performed as follows:

"The grain, freed of broken and badly shrunken kernels, is sampled and about 2½ gm. transferred to a glass weighing bottle. From 100 to 300 specimens thus prepared are placed in a drying oven at 110° C. by a themoregulator. In case of each such charge, from 4 to 6 2 gm. specimens taken from a large sample of wheat used as a check are placed in different parts of the oven. At the end of 4 hours the check samples are taken out, allowed to cool, and weighed. They are then returned to the oven and after 2 hours further drying are weighed again. If the loss in weight during the last 2 hours has been slight and the total loss in weight by all the check samples is normal, it is assumed that all the samples are dried; otherwise the heating is continued 2 hours longer. Then the weighing bottles are quickly removed from the oven, stoppered at once, and allowed to cool in desiccators. From each dried sample a 1 gm. portion of wheat is weighed out, transferred to a Kjeldahl flask, and the nitrogen determined as in the ordinary method."

The method is also discussed and some of the results obtained with it are given.

Extraneous mineral matter in rice, F. W. RICHARDSON (*Analyst, 35 (1910), No. 412, pp. 293, 294*).—The author has devised a method for determining by difference both the insoluble and soluble extraneous mineral matter used for facing rice, as follows: "Five gm. of the rice grains are treated in a platinum dish with 0.5 gm. of ammonium fluorid, 2 cc. of water, and 2 cc. of strong hydrochloric acid, and stirred occasionally during 10 minutes with a stout platinum wire. The rice is then well washed with water, which is decanted off, and the cleaned rice is incinerated over a low flame. The difference between the ash so found and the total ash after recarbonation gives the extraneous mineral matter."

The method gives higher results than Kržižan's method,[a] because the latter is based on the assumption that only facing material which is insoluble in dilute acid is employed.

The phosphorus of the flat turnip, B. L. HARTWELL and W. B. QUANTZ (*Jour. Biol. Chem., 7 (1910), No. 6, p. xxxviii*).—The percentage of phosphorus in the dry matter of the flat turnip is influenced by the amount of available phosphorus which the soil contains.

Ten per cent of this phosphorus was soluble in 95 per cent alcohol and 70 per cent of it was subsequently soluble in 0.2 per cent hydrochloric acid. From 50 to 70 per cent of the phosphorus in this extract was precipitated by a molybdenum mixture containing only a trace of free nitric acid. In the fresh turnip 80 per cent of the phosphorus was found in a somewhat colloidal aqueous solution and fourth-fifths of this could be directly precipitated with magnesium oxid and the official mixtures of magnesium and molybdenum. It appears from the work that probably four-fifths of the phosphorus of fresh flat turnips is in the soluble form and in combination as inorganic phosphorus.

Estimating the shell content of cocoa, F. FILSINGER and W. BÖTTICHER (*Ztschr. Offentl. Chem., 16 (1910), No. 16, pp. 311, 312*).—The authors examined cocoas according to the Goske method (E. S. R., 23, p. 12), but from their work conclude that it is not satisfactory for quantitative work.

Contribution to the chemistry of vinegar (*Deut. Essigindus., 14 (1910), Nos. 1, pp. 1–4, fig. 1; 2, pp. 9–12; 3, pp. 17–20; 4, pp. 25–27; 5, pp. 33, 34*).—This article has particular reference to the methods for the analysis of vinegar.

Pepper and its adulterants, E. COLLIN (*Ann. Falsif., 3 (1910), No. 21, pp. 272–233, figs. 6*).—A consideration of the microscopical characteristics of powdered white and black pepper and the common adulterants, such as spurge laurel fruit, normal pepper by-products, juniper berries, almond refuse, olive stems, and foreign starches. The technique for the separation and for intensifying the microscopic appearance of the adulteration, as employed in the Laboratoire Central de la Répression des Fraudes, is given.

The fluorin content of wine, A. KICKTON and W. BEHNCKE (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 4, pp. 193–208*).—The authors have modified the Van Dam method[a] and find it far more accurate than Treadwell and Koch's method.[b] They were not able to verify Van Dam's findings in regard to the relation of the intensity of the etching to the amount of fluorid present, but believe that if the etching can be only detected by blowing the breath against the glass less than 1 mg. of fluorin is present. Practically all the wines examined in these tests contained fluorid, and from this the authors assume that it is present under normal conditions.

Constituents of lemon oil, E. GILDEMEISTER and W. MÜLLER (In *Festschrift Otto Wallach. Göttingen, 1909, pp. 439–451; Semiann. Rpt. Schimmel and Co., 1909, Oct., pp. 62–65; abs. in Chem. Zentbl., 1909, II, No. 26, pp. 2159, 2160; Jour. Soc. Chem Indus., 29 (1910), No. 2, p. 109*).—Low boiling fractions of lemon oil freed from oxygenated constituents with alcohol contained small quantities of

---

[a] Ztschr. Untersuch. Nahr, u. Genussmtl., 11 (1906), p. 645.

[b] Ztschr. Untersuch. Nahr. u. Genussmtl., 16 (1908), p. 617.

[c] Ztschr. Analyt. Chem., 43 (1904), p. 469.

pinene and camphene, particularly l-camphene. Pinene was present in the active and inactive form, but chiefly as l-a-pinene, which yielded optically active pinonic acid ($[a]_D$ = about $-65°$ in chloroform) on oxidation. The presence of β-phellandrene and β-pinene was also verified. In all the fractions which boiled at 173° C., or over, γ-terpinene could be detected and yielded on oxidation with alkaline permanganate a characteristic erythritol (melting point 237°), which corresponded in its properties to 1.2.4.5 tetrahydroxyhexahydrocymene. The fraction of sesquiterpene also contained bisabolene found in the essential oil of Bisabol myrrh and probably also cadinene.

Detection of saccharin in fatty, starchy, and protein-rich foods, Tortelli and Piazza (*Abs. in Chem. Ztg., 34 (1910), No. 70, p. 621*).—The foodstuff is mixed with from 12 to 18 parts of sand and from 7 to 10 parts of slacked lime, and, amid stirring, 50 cc. of concentrated alcohol. During this time the mixture is heated on the water bath to the boiling point. From 5 to 15 cc. of a saturated salt solution is then added, well mixed, and the fluid poured off. This process is repeated from 3 to 4 times, the precipitate collected on the filter, and washed with 40 cc. of hot alcohol, which also removes the extractive substances and the fats. The alcoholic solution is then concentrated and extracted with petroleum ether. The saccharin remains behind and the fats, etc., are removed. To the salt of saccharin a slight excess of sulphuric acid is added and the mass extracted with ether.

The method is apparently also of value in the quantitative estimation of saccharin. Various modifications of the method are made when other substances are examined.

Identification of saccharin, Tortelli (*Abs. in Chem. Ztg., 34 (1910), No. 70, p. 621*).—The saccharin obtained by the above method is reduced with magnesium in a test tube. From the magnesium sulphid produced, hydrogen sulphid can be detected with the nitroprussid reaction.

A new reaction for glucuronic acid, G. Goldschmiedt (*Ztschr. Physiol. Chem., 65 (1910), No. 5–6, pp. 389–393*).—If to a trace of glucuronic acid or glucuron, dissolved in 100 cc. of water, is added from 1 to 2 drops of a 15 per cent alcoholic solution of α-naphthol, and then from 3 to 4 drops of concentrated sulphuric acid, a green coloration having a bluish hue is obtained. If more water is added the solution will have a violet color.

Rapid detection of emulsin, E. F. Armstrong (*Jour. Physiol., 40 (1910), No. 3, p. XXXII*).—A method which is based on the use of Guignard's sodium picrate paper for the detection of the hydrogen cyanid produced.

The caseification of raw milk by the rennets of boiled milk, C. Gerber (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 19, pp. 1202–1204*).—In boiling raw milk the lactoglobulin and lactalbumin are coagulated and become inert. The author shows that a close relation exists between the presence of these protein bodies and the resistance to coagulation by rennet. This explains why boiled milk coagulates quicker than unboiled milk.

Comparison between the mode of action of certain inhibitory salts and proteins coagulated by heat on caseification by boiled milk rennet, C. Gerber (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 21, pp. 1357–1360*).—The inhibitory action of gold, copper, mercury, silver, and certain metals of the platinum group does not exert itself upon the proteolytic diastase but upon the casein, which it makes more resistant against the rennet contained in boiled milk. These metals combine with the casein and do not act as antibodies but as inhibitors. Lactoglobulin and lactalbumin, which are the resisting bodies in raw milk against coagulation by rennet of boiled milk, also act on the casein as inhibitors. Raw milk does not contain these substances in a free state but in combination with the casein, with which it forms a complex.

[Action of various metallic salts on the coagulation of milk], C. GERBER (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), Nos. 8, pp. 382–386; 19, pp. 935–940; 69 (1910), Nos. 25, pp. 102–108; 27, pp. 211–216*).—The results of tests obtained with gold, platinum, palladium, iridium, osmium, ruthenium, rhodium, iron, and copper salts on the rate of coagulation of raw and boiled milk with vegetable and animal ferments from various sources are reported in these papers, together with notes on the effect of different temperatures.

Refractometry of the calcium chlorid serum of milk, G. FENDLER, C. BORKEL, and W. REIDEMEISTER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 3, pp. 156–169*).—The results of a refractometric examination of the calcium chlorid milk serum of Berlin market milk (See E. S. R., 18, p. 811; 19, p. 707; 20, p. 706; 21, p. 11; 22, pp. 514, 612; 23, p. 309) are here summarized.

About the coagulation of woman's milk, B. SPERK (*Abs. in München. Med. Wchnschr., 57 (1910), No. 9, p. 501*).—Woman's milk can be made to coagulate very easily if some calcium chlorid is added before the coagulating reagent. This indicates that cow's milk coagulates much easier than woman's milk because it contains more calcium salts.

A new apparatus for determining the acidity of milk, K. SCHERN (*Molk. Ztg. Berlin, 20 (1910), No. 38, p. 445, fig. 1*).—The apparatus described is named the "lacto-acidometer" and consists of a glass-stoppered cylinder which has dilations at its upper and lower extremities. Between these 2 dilations the cylinder is graduated from 0 to 20. The lower extremity holds just 10 cc. of milk. In making the test 2 drops of a 2 per cent alcoholic solution of phenolphthalein are added to the milk and enough one-fortieth normal sodium hydrate solution from a dropping bottle to produce a permanent pink tint.

Acidity of milk, A. MONVOISIN (*Hyg. Viande et Lait, 4 (1910), No. 5, pp. 241–246*).—A general discussion of the subject.

Raw and boiled milk, A. ROCHAIX and L. THEVENON (*Rev. Hyg. et Pol. Sanit., 32 (1910), No. 5, pp. 497–518*).—A critical review of the various methods of differentiating boiled from raw milk. See also previous work (E. S. R., 22, p. 414).

The dirt content of milk, H. WELLER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 11, pp. 654, 655*).—A polemical article (E. S. R., 17, p. 587; 21, p. 414; 22, pp. 11, 612), in which the author states that no fat nor casein could ever be detected among the dirt residues obtained with the Weller method in normal milk.

The chemistry of milk and dairy products in the year 1909, M. SIEGFELD (*Chem. Ztg., 34 (1910), Nos. 70, pp. 617–619; 71, pp. 628–630*).—A retrospect of the more important advances made in dairy chemistry during 1909.

Report of the food inspection laboratory at Erfurt for the year 1908, W. LUDWIG (*Ztschr. Öffentl. Chem., 16 (1910), Nos. 12, p. 248; 13, pp. 264–266*).—This report includes the results of an examination of meat, sausages, milk, cream, butter, oleomargarine, and so-called nicotine-free cigars.

Progress in tobacco chemistry, R. KISSLING (*Chem. Ztg., 34 (1910), No. 55, pp. 486–488*).—A report of the progress in tobacco chemistry from the viewpoint of agriculture, preparation of tobacco, and smoking.

A review of discoveries on the mutarotation of the sugars, C. S. HUDSON (*Jour. Amer. Chem. Soc., 32 (1910), No. 7, pp. 889–894*).—A critical and historical review of the subject.

Occurrence of formaldehyde in sugar cane juice and sugarhouse products, P. A. YODER and W. G. TAGGART (*Internat. Sugar Jour., 12 (1910), No. 137, pp. 239–245; Separate, pp. 8; Jour. Indus. and Engin. Chem., 2 (1910), No. 6, pp. 260–264; Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 4, pp. 208–214*).—The authors show that LaWall (E. S. R., 22, p. 212) was probably in error when he assigned furfurol as the cause for the reaction obtained with Hehner's modified method and sugar, and that in all probability the latter contained traces of formaldehyde which did not give a reaction with the less sensitive Rimini's reagent. Ramsey and Trillat's finding in regard to the production of formaldehyde by caramelization of cane sugar was verified.

Where formaldehyde was added to the juice for the purpose of preservation the ultimate products all contained a certain amount of formaldehyde, which however was minimal in the first sugar. It is therefore evident that all the formaldehyde does not boil away in the manufacture of sugar products.

A modification of the Hehner-Richardson formaldehyde test was made by substituting peptone for the albumose.

Progress in the manufacture of rice starch, H. SCHREIB (*Chem. Ztg., 34 (1910), No. 59, pp. 522, 523*).—A description of some of the newer procedures in the manufacture of rice starch, with a very brief description of some of the machinery.

Progress in fermentation chemistry for 1909, O. MOHR (*Ztschr. Angew. Chem., 23 (1910), No. 20, pp. 916–924*).—A retrospect of the more important advances made in the field of fermentation chemistry for the year 1909, in which the subjects considered are classified under the following headings: Raw materials and their preparation, fermentation organisms and the fermenting processes, and products of the fermentation industry—vinegar, alcohol, wine, and beer.

The custom house laws with reference to methyl and denatured alcohol, R. P. DUCHEMIN (*Rev. Gén. Chim., 13 (1910), No. 8, pp. 137–148*).—A discussion in regard to the taxation and general laws relating to the manufacture of methyl and denatured alcohol.

METEOROLOGY—WATER.

Meteorological observation in relation to agriculture (*Dept. Agr. and Tech. Instr. Ireland Jour., 10 (1910), No. 4, pp. 735–745*).—This article describes briefly the weather services of different countries and discusses the relation of the meteorological observations to agriculture.

Résumé of a trial of long-period weather forecasting, V. RACLOT (*Assoc. Franç. Avanc. Sci., Compt. Rend., 37 (1908), pp. 418–424, dgms. 2*).—Trials of two methods during 1907–8 are reported.

Climate and distribution of plants in the Harz, J. SCHUBERT and A. DENGLER (*Klima und Pflanzenverbreitung im Harz. Eberswalde, 1909, pp. 36*).—Observations on variations of temperature, pressure, and rainfall with elevation and on plant distribution with relation to these variations are briefly recorded. A short bibliography of the subject is also given.

Bulletin of the Mount Weather Observatory (*U. S. Dept. Agr., Bul. Mount Weather Observ., 3 (1910), pt. 3, pp. 127–199, figs. 12, charts 6*).—This number contains the following articles: Free Balloon Ascensions at Omaha and Indianapolis, September 25 to October 12, 1909 (illus.), by W. R. Blair; Studies on the General Circulation of the Atmosphere (illus.), by F. H. Bigelow; Recent Publications Relating to Aerology, by C. F. Talman; The Argentine Meteorological Station in the South Orkney Islands, by C. L. Chandler; and Free Air Data at Mount Weather for April, May, and June, 1910 (illus.), by W. R. Blair.

Monthly Weather Review (*Mo. Weather Rev., 38 (1910), No. 8, pp. 1147–1308, figs. 13, charts 33*).—This number contains the usual climatological summaries, weather forecasts and warnings for August, 1910, river and flood observations, lists of additions to the Weather Bureau library and of recent papers on meteorology and seismology, a condensed climatological summary, and climatological tables and charts. There are also special papers on Average Stream Flow of the Cape Fear, Tar, and Roanoke Rivers of Eastern North Carolina; Stream Flow of the Pearl and Pascagoula Rivers in Mississippi (illus.), by F. Montgomery; Heavy Rainfall and Flood at Lincoln, Nebr., by C. C. Garrett; The Work of the Weather Bureau for the Benefit of Horticulture, by M. W. Hayes; Conservation of Water in the Lower Trinity River (illus.), by H. P. Porter; Relation of the Weather Bureau to the Conservation of Our Natural Resources, by W. Spry; What is a Desert? by J. C. Alter; Mountain Sites for Observatories on the Pacific Slope (illus.), by A. G. McAdie; Dry Season in Idaho, by C. A. Donnel; and Review of the Spokane River Hydroelectric Power Plants (illus.), by J. C. Ralston.

Meteorological observations at the Massachuetts Agricultural Experiment Station, J. E. Ostrander and C. M. Damon (*Massachusetts Sta. Met. Buls. 261, 262, pp. 4 each*).—Summaries of observations at Amherst, Mass., on pressure, temperature, humidity, precipitation, wind, sunshine, cloudiness, and casual phenomena during September and October, 1910. The data are briefly discussed in general notes on the weather of each month.

Meteorology and climate (*Off. Yearbook N. S. Wales, 1908–09, pp. 7–14*).—The meteorological and climatological conditions of New South Wales are described, and tables showing temperature and precipitation at different places in the State are given.

British rainfall, 1908, 1909, H. R. Mill (*London, 1909, pp. 100+304, pls. 9, figs. 44; 1910, pp. 120+308, pls. 11, figs. 39; rev. in Nature* [*London*], *84* (*1910*), *No. 2139, pp. 523, 524; Gard. Chron., 3. ser., 48* (*1910*), *No. 1244, pp. 311, 312*).—These reports deal with the rainfall of the British Isles during the years named as recorded by over 4,500 voluntary observers.

The report for 1908 contains special articles on New Recording Rain Gages, by H. R. Mill; Ratio of Monthly Rainfall between Denton House, Brampton, and Seathwaite, by T. G. Charlton; Rainfall Observations in Snowdonia, by A. Lockwood; and Twenty Years' Rainfall at Carrablagh, County Donegal.

The report for 1909 contains special articles on The British Rainfall Organization after Fifty Years, by H. R. Mill; and The Spot in England and Wales where Snow Lies Latest, with Observations of Snowfall on the Snowdonian Range, by J. R. G. Jones. It also records the fact that the British Rainfall Organization had been placed on a permanent footing with a nucleus of an endowment in charge of trustees. The development of the organization is described and the details of the new constitution are given.

In addition to the usual data the reports discuss heavy rains in short periods and rainfall days. For the British Isles as a whole the rainfall for 1909 (38.56 in.) was exactly the average, but during the last 21 years dry years have been twice as frequent as wet years.

Decline in rainfall, G. Guilbert (*Assoc. Franç. Avanc. Sci., Compt. Rend., 37* (*1908*), *pp. 412–418*).—Data are presented to show that there has been a general diminution of rainfall in France and that this decline bears a well defined relation to the decrease in the forested area.

On the quantity of ammonia and nitric acid in the rain water collected at Flahult in Sweden, H. von Feilitzen and I. Lugner (*Jour. Agr. Sci., 3* (*1910*), *No. 3, pp. 311–313*).—The data here reported have been noted from another source (E. S. R., 23, p. 220).

The effect of cannonading on hailstorms, C. André (*Compt. Rend. Acad. Sci.* [*Paris*], *150* (*1910*), *No. 17, pp. 1023, 1024; abs. in Rev. Sci.* [*Paris*], *48* (*1910*), *I, No. 19, p. 604*).—The author has compared the hailstorms observed at 32 stations in the Rhône Valley during two periods, 1881 to 1900 and 1900 to 1908, cannonading against hail having been brought into use during the latter period. The figures do not show that the cannonading had been an effective means of protection.

Geology and water resources of the San Luis Valley, Colorado, C. E. SIEBENTHAL (*U. S. Geol. Survey, Water-Supply Paper No. 240, pp. 128, pls. 13, figs. 15, map 1*).—This report is based upon field work done in 1904. The report attempts "to present such a summary of the geologic conclusions of previous workers together with the observations of the writer as would give to the reader a comprehensive view of the geology of the San Luis Valley and the surrounding rim and enable him to understand the relation of the artesian basin to the geologic structure; to give a description of the artesian basin, its development, and its prospects; finally, to make accessible to the reader such information in regard to climate, agriculture, irrigation, and water resources as is available and of general interest."

The water supplies, sewerage, and subways of Paris in relation to the present floods, H. A. SOPER (*Engin. News, 63 (1910), No. 5, p. 144; abs. in Wasser u. Abwasser, 3 (1910), No. 4, p. 141*).—This article describes the hydrology of the Seine and its course and flow with reference to the underground structures, sewers, subways, etc., of the city of Paris. The two separate and complete water supplies, one from spring water and filtered river water for drinking purposes, and the other from the river direct for other uses, are described, as are also the methods of sewage disposal with reference to the water supply. The data given which are of special agricultural interest are the area and efficiency of the various sewage farms maintained by the city. On these farms irrigation sewage is applied at an average rate of 10,000 gal. per acre per day by the furrow system of irrigation.

On the conditions of effective filtration of subterranean waters in limestone formations, E. VAN DEN BROECK and E. A. MARTEL (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 12, pp. 574–576; abs. in Rev. Sci. [Paris], 48 (1910), II, No. 14, pp. 444, 445*).—It is shown that waters from certain limestone formations are well filtered and potable and that improper filtration occurs only where there are faults and fissures in the limestone.

A pure water supply for the farm (*Canad. Farm, 2 (1910), Nos. 17, p. 3; 18, p. 3, fig. 1; 19, p. 2, figs. 2; 20, p. 5, fig. 1; 21, p. 3, figs. 3; 22, p. 2, figs. 2; 23, p 2, fig. 1; 24, p. 2, figs. 2; 25, p. 2, figs. 2; 26, p. 2, figs. 3; 3 (1910), Nos. 1, p. 2, figs. 3; 2, p. 2, figs. 4; 3, p. 2, figs. 2; 4, p. 2, figs. 3; 5, p. 2, fig. 1*).—This is a series of popular articles on this subject by F. T. Shutt, F. C. Harrison, C. J. Lynde, W. T. Connell.

Sterilization of polluted water by ultraviolet rays, K. C. GRANT (*Engin. News, 64 (1910), No. 11, p. 275, figs. 3*).—The apparatus and methods used in experiments in the physiological laboratory of the Sorbonne in Paris are briefly described.

In brief, the process used consisted in exposing the water to the ultraviolet rays from a quartz tube mercury arc lamp ("Westinghouse silica" type) suspended close to (2 cm. above) the surface of the water. Two such lamps, requiring 660 watts per hour, were sufficient to sterilize water containing 5,000 micro-organisms per cubic centimeter flowing through a trough below them at the rate of 1,270 cu. ft. per hour, or 960 cu. ft. per kilowatt hour. "At a cost of 1 cent per kilowatt hour, therefore, it costs about $1.40 for lamp energy to sterilize 1,000,000 gal." It is stated that these experiments have demonstrated the commercial possibility of purifying water in large quantities by means of ultraviolet rays.

Sewage disposal plants for private houses, A. MARSTON and F. M. OKEY (*Iowa State Col. Engin. Expt. Sta. Bul., 4 (1909), No. 6, pp. 44, figs. 6*).—This bulletin embodies the results of experience with four experimental plants built at the Iowa Station in 1904 with a view to studying the designing, construction, and operation of sewage disposal plants adapted to private houses, and describes with detailed plans and specifications a model plant which is recommended for this purpose.

SOILS—FERTILIZERS.

Soils of the Ozark region, C. F. MARBUT (*Missouri Sta. Research Bul. 3, pp. 151–273, pl. 1, map 1*).—This is a report on the soil groups of the Ozark region of Missouri. The soils are broadly classified, and each kind of soil is described as to origin, character, distribution, and general fertility.

Regarding the soils in general the author states:

"These soils are all silts of varying colors, running from black, through various shades of reds and yellow, to white or gray. The proportions of clay and sand never or very rarely run high in any of these soils. They are, therefore, usually mellow, or are easily made so with fair treatment. They are well drained, also, and are moderately early and warm. These characteristics are due in part to the greater or less abundance of stone or gravel in the soil. It is almost universal in its occurrence and in some of the types it is very abundant.

"The subsoils are universally reddish in color. The intensity of the color varies somewhat but is everywhere greater than that of the soil. Like the soils they contain a considerable proportion of silt, very little sand, but also a considerably higher percentage of clay than the soils. The average percentage of clay in the soil runs from 10 to 20 and that of the subsoil is a little higher as a rule but rarely running above 20.

"Like the soil, the subsoil has a varying proportion of stones and gravel intimately mixed with the other constituents. Where the soil is extremely stony the subsoil is slightly less stony. Where the soil has very few stones the subsoil usually has a higher proportion. The stone content in the subsoil is more constant over the region as a whole than in the soil."

A comprehensive discussion on the agricultural conditions and possibilities of the Ozark region and of the systems of farming adapted to the region is also presented.

Soil management in the Ozark region, M. F. MILLER (*Missouri Sta. Bul. 88, pp. 163–189, figs. 9, map 1*).—The work here reported was supplementary to that recorded in the general report on the soils of the Ozark region noted above, and consisted of chemical analyses of the different soil types, a study of the agricultural conditions of the region, and investigations on a number of soil experiment fields established on typical soils of the region, for the purpose of determining the best methods of soil management for the soils on which they are located, from which conclusions regarding the most practical methods of fertilizing and cropping these soils are drawn.

"The soil management problems of a considerable part of the Ozark border lands are on the whole not greatly different from those of north Missouri, since these soils include some of the best agricultural sections of the State. There are, however, large areas where the land is so badly eroded and where the soils are so lacking in fertility that the problems approximate those of the Ozark Plateau and Center regions. In the better region, particularly in the Barton and Springfield groups, the lands are devoted largely to the growing of corn, wheat, oats, and hay, and stock farming has reached a high degree of perfection.

"Unfortunately, the fact that wheat and corn have given such good returns on a great deal of this land has led to the excessive culture of these crops without proper systems of crop rotation, resulting in many cases in a greatly decreased humus supply and a consequent decrease in productiveness. In the sections where wheat has been the most important money crop, its continued culture without the proper use of commercial fertilizer, which in many cases is depended upon too largely for securing a crop, has thus caused a much greater depletion of humus than would otherwise be found practicable."

The results of chemical analyses of 26 samples show a striking deficiency in nitrogen and usually in phosphorus.

The methods of soil improvement recommended are, therefore, based upon the use of fertilizers, especially phosphatic fertilizers, in connection with systems of live stock production, crop rotation, and legume growing, which will build up the humus and nitrogen of the soil and supply the deficiencies of phosphoric acid.

Alkali soils.—Irrigation waters, G. S. FRAPS (*Texas Sta. Bul. 130, pp. 5–28*).—This bulletin discusses the nature, origin, and effect of alkali on plants, the prevention of alkali and the utilization of alkali soils, the occurrence of alkali in Texas, and the quality of irrigation waters of the State with reference to the accumulation of alkali in the soil. The examination of a large number of samples of soil showed that alkali occurs in almost all sections of the State, even in the relatively humid eastern portion. The alkali soils, however, occur, as a rule, in comparatively small areas.

A bibliography is appended.

Soil moisture studies at the North Platte substation, W. W. BURR (*Nebraska Sta. Rpt. 1909, pp. 62–99, charts 2*).—Tabular summaries are given of observations on moisture in soils down to a depth of 6 ft. under different methods of cropping in the experiments which were begun at this substation in 1907 in cooperation with the Bureau of Plant Industry of this Department. Mechanical analyses of the soil are also reported and the method of sampling used is described. The seasonal rainfall at North Platte for 35 years, 1875 to 1909, is given in tables and diagrams.

The movement of water in the soil and the air in the soil, N. S. NESTEROV (*Dnevn. XII. S''iezda Ross. Est.-Isp. i Vrach., No. 8, p. 337; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 1, pp. 86, 87*).—The author maintains that the movement, in the soil, of the water which is not subject to the action of the capillary forces but is transported by the force of gravity, depends essentially on the pressure of the air in the soil. This factor determines both the extent of the percolation of the precipitation into the soil and the velocity of the movement of the underground waters. This theory of the author is based upon data of many years' observations under a variety of natural hydrological conditions, and on results obtained from experiments in introducing water into the soil by means of a special form of apparatus.

The air in the soil greatly impedes the percolation of the water and brings about two very unfavorable conditions, viz, the run-off of most of the water and the absorption of a small amount by the soil. Conditions may be improved by air drainage of the soil and the boring of holes through it. The investigation of the pressure of the air in the soils is, in the opinion of the author, one of the urgent problems of agriculture.

Determination of the absorbed bases in the soil, D. N. PRIANISHNIKOV (*Dnevn. XII. S''iezda Ross. Est.-Isp. i Vrach., No. 7, p. 301; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 1, pp. 147, 148*).—It is often assumed that only the zeolitic substances in soils are available as plant food, but there is very little positive data supporting such a view. On the other hand, pot experiments at the Moscow Agricultural Institute begun in 1901 show, in agreement with laboratory experiments by K. D. Glinka, that anhydrous silicates (mica) are capable of giving in the course of the growing period considerable quantities of potash to the plants.

Laboratory studies were made of the exchange of bases in soils and silicates in such cases. For this purpose soils of various types were used and also individual silicates (mostly potash silicate). Of the displaced bases, calcium, potassium, and ammonium were determined. Ammonium nitrate served as the displacing solution for calcium, potassium chlorid for ammonium, and ammonium chlorid, barium chlorid, and preferably, ammonium nitrite, for potash.

On the basis of absorbed lime the richest soil was found to be a chernozem, a poorer a forest clay, and still poorer a podzol. Chernozem also proved richest in displaced ammonium. In the determination of displaced potash muscovite gave higher values than orthoclase and sanidine (this being in agreement with the pot experiments). Ammonium chlorid displaced more potassium than did barium chlorid. For the displacement of potash, however, ammonium nitrite is most suitable since it gives close duplicates and allows rapid work (being readily removed by mere heating of the aqueous solution).

The exchange of bases in the salts of the so-called "weak" acids of the soil, P. EHRENBERG (*Landw. Jahrb., 38 (1909), pp. 857–861; abs. in Chem. Abs., 4 (1910), No. 11, p. 1521*).—The author concludes from his investigations that the absorption of weak acids, such as carbonic acid and phosphoric acid, by clay and clay soils is not due to colloidal but to chemical action. The strong acids, such as bromic, nitric, and chromic acids, form relatively soluble calcium salts, while the weak acids form rather insoluble salts and are thus apparently absorbed by the soil.

Availability of soil nitrogen in relation to the basicity of the soil and to the growth of legumes, T. L. LYON and J. A. BIZZELL (*Jour. Indus. and Engin. Chem., 2 (1910), No. 7, pp. 313–315; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 15, p. 967*).—In a series of comparative experiments results were obtained which confirmed the commonly accepted view that a certain degree of basicity in the soil is favorable to nitrification, and indicate that the addition of lime to a soil deficient in this constituent produces a substantial increase in the nitrates for at least four years after application. The growth of alfalfa and possibly other leguminous plants on a soil well supplied with lime further promotes nitrification. Timothy grown with alfalfa contained a higher percentage of nitrogen than when grown alone, the increase being more marked when the soil was well limed.

Organic phosphorus compounds of the soil, J. KOROLEV (*Izv. Moskov. Selsk. Khoz. Inst. (Ann. Inst. Agron. Moscou), 16 (1910), No. 2, pp. 1–98*).—The author gives a review of investigations on this subject from 1831 to the present time, and reports the results of his own investigations, from which he draws the following conclusions:

No appreciable amount of phosphorus of the chernozem soil of Ufa belongs to the mineral phosphates. Lecithin or a similar compound is not found in this soil. A small portion of the organic phosphorus compounds is soluble in 12 per cent hydrochloric acid. The acid solubility of the organic phosphorus of this soil increases on heating the soil with water, resulting in phosphorus compounds slightly soluble in water and easily soluble in acids. The solubility of organic phosphorus compounds is greater in ammonia than in water after the soil has been treated with hydrochloric acid. The organic phosphorus of the ammoniacal solution is not fully precipitated with hydrochloric acid, a portion of the phosphorus remaining in the solution. This partial hydrochloric-acid solubility of the phosphorus of the ammoniacal solution is apparently due to the action of the ammonia on the organic phosphorus compounds of the soil as well as on that of the ammoniacal solution, resulting in the formation of acid-soluble phosphorus compounds.

As a conclusion to his review the author presents two theses regarding the present status of the organic phosphorus of the soil: (1) A part of the phosphorus of the soil does not belong to the mineral phosphates; (2) there is a definite relation between the organic matter and the phosphorus of a soil.

The author believes that the characteristics of these phosphorus compounds of the soil are an important study for the future. The direction of these investigations must be toward an understanding of the properties of humus, the organic colloids, and the organic mineral compounds of the soil.

Report of the physiologist, O. LOEW (*Porto Rico Sta. Rpt. 1909, pp. 15–18*).—This report is devoted to a brief statement of progress in investigations on "sick" or "tired" soils of Porto Rico (E. S. R., 23, p. 422).

Conservation of the purity of soils in cereal cropping, H. L. BOLLEY (*Science, n. ser., 32 (1910), No. 825, pp. 529–541*).—This is an argument in favor of the more general adoption of more careful methods of seed disinfection, soil culture, and rotation of crops to reduce losses from plant diseases. It is stated that it is not necessary, for example, that "wheat yields should fall from the now promising ones of 30 to 60 bu. per acre to the general average of 12 to 15," but that this can not be prevented "unless we recognize this question of soil sanitation, or, if you will, the necessity of conserving the virgin purity of the land."

Soil wastes in the cane field (*Queensland Agr. Jour., 25 (1910), No. 3, pp. 113–117*).—This article discusses the drainage wastes and means of reducing loss from this source, as well as the fertilizer requirements of cane soils. Formulas for various fertilizer mixtures for cane are given, and the best methods of application are discussed. Fractional application and thorough mixing of the fertilizers with the soil to a depth of 3 in. are recommended.

Experiments with nitrogenous fertilizers, W. SCHNEIDEWIND ET AL. (*Landw. Jahrb., 39 (1910), Ergänzungsb. 3, pp. 209–236; abs. in Chem. Zentbl., 1910, II, No. 6, p. 405; Jour. Soc. Chem. Indus., 29 (1910), No. 17, pp. 1070, 1071*).—These experiments included comparative tests of sodium nitrate, potassium nitrate, calcium nitrate, ammonium sulphate, lime nitrogen, organic compounds, and green manures, studies of losses of nitrogen with top-dressings of ammonium sulphate and calcium nitrate, and the fixation of ammoniacal nitrogen by the zeolites of the soil.

The soils used in these experiments were of two kinds, 90 per cent sand plus 10 per cent clay, and 50 per cent sand plus 50 per cent clay. The crops grown in the experiments included oats, rye, and potatoes for the organic fertilizers, and clover, peas, beans, and vetches for the green manures.

The effect of the sodium nitrate was most pronounced. The general effect of the ammonium sulphate as compared with the sodium nitrate was rated at 93 per cent, but as a source of nitrogen at only 89 per cent. With potatoes the ammonium sulphate was as effective as the sodium nitrate. The calcium nitrate as compared with sodium nitrate was rated at 96 per cent both as to general effectiveness and as a source of nitrogen. Its effect was most pronounced with potatoes. The lime nitrogen as compared with the sodium nitrate was rated at 85 per cent in general effectiveness and at 82 per cent as a source of nitrogen; as compared with ammonium sulphate its general effect was rated at 91 per cent and as a source of nitrogen at 90 per cent.

The organic fertilizers were much less effective forms of nitrogen. Animal guano was 67 per cent as effective as sodium nitrate, fish meal 73 per cent, meat meal 71 per cent, dried blood 56 per cent, ground horn 55 per cent, and ground leather 15 per cent.

On sandy soils poor in lime there was no loss of nitrogen with either ammonium sulphate or lime nitrogen applied as a top-dressing. On soils rich in lime, there was considerable loss of nitrogen when ammonium sulphate was applied as a top-dressing, but almost no loss of nitrogen with lime nitrogen. With a high clay content the loss from ammonium sulphate on soils rich in lime was greatly reduced through the absorbent action of the clay.

With natural soils neither the natural nor the highly absorbent artificial zeolites were capable of fixing appreciable quantities of ammoniacal nitrogen in the soil for a long period. Ammonium sulphate and sodium nitrate gave like results on soils containing either high or low contents of clay.

Green manuring with yellow clover was more effective than with peas, beans, and vetch, especially on imperfectly aerated soils, because of the greater readiness with which the clover decomposed. The effect of the clover was not so pronounced on the sandy as on the clay soil, 40.8 per cent of the nitrogen of the clover being assimilated in the clay soil as compared with 36.5 per cent in the sandy soil. The nitrogen of peas, beans, and vetch was assimilated at the rate of 30.5 per cent in the clay soil as compared with 33.5 per cent in the sandy soil.

Fertilizer experiments with sodium nitrate, ammonium sulphate, lime nitrogen, and Norwegian nitrate, HEY (*Sächs. Landw. Ztschr., 58 (1910), Nos. 10, pp. 124–126; 11, pp. 142, 143*).—In comparative tests on light loam soil with oats and rye the sodium nitrate gave the best results with rye during the first year and lime nitrogen the best returns with oats. The following year, with spring application, both lime nitrogen and Norwegian nitrate gave better results than sodium nitrate. The nitrogenous fertilizers were especially effective on crops following potatoes which had received liberal applications of manure.

Sulphate of ammonia, C. G. ATWATER (*Penn. Dept. Agr. Bul. 193, pp. 106–110*).—This is a plea for the introduction of by-products of coke ovens into the United States with a view to saving the large amount of sulphate of ammonia now going to waste in the coking of coal.

The nitrogen of the air and its utilization, K. KAISER (*Der Luftsickstoff und seine Verwertung. Leipsic, 1910, pp. 102, figs. 13*).—This is a concise summary of the present knowledge with reference to nitrogen in the economy of nature, sources of nitrogen, nitrogen combustion, the formation of ammonia and cyanid compounds from atmospheric nitrogen, and fixation of nitrogen by means of bacteria. The book describes some of the newer processes for manufacturing nitrogen compounds from the air and discusses the industrial aspect of this subject.

Calcium cyanamid and some of its decomposition products, A. STUTZER and F. REIS (*Jour. Landw., 58 (1910), No. 1, pp. 65–76; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 572, II, p. 537*).—This article is based upon investigations which have been in part reported elsewhere (E. S. R., 23, p. 718).

It is shown that the first stage in the decomposition of calcium cyanamid is brought about by the absorption of carbon dioxid, followed by the decomposition of the cyanamid by chemical and not biological processes into urea and similar compounds. Ferric oxid is the most important soil constituent concerned in this change. The urea is rapidly converted into ammonia and subsequently into nitrates. Dicyandiamid is not available as a source of nitrogen for higher plants, but there is no danger from its formation from lime nitrogen in the soil. It remains in the soil unchanged for a long time, and while it may retard germination it is not injurious to growing plants, bacteria, yeasts, and streptothrix if other available forms of nitrogen are present.

Comparative tests of the action of 40 per cent potassium chlorid, potassium silicate, and feldspar, F. HONCAMP ET AL. (*Mitt. Deut. Landw. Gesell.,* *25 (1910), Nos. 4, pp. 46–49; 5, pp. 61–67, figs. 10).*—In pot experiments with oats, rye, beans, potatoes, and clover, extending over two years, 1908 and 1909, the 40 per cent potash salt gave much larger yields than either the silicate or feldspar, the latter showing no increase whatever, whereas the silicate gave a slight increase in yield. Ammonium sulphate applied with the phonolite did not increase the solubility of its potash, and there was no beneficial after-effect of the potassium silicate the second year.

The utilization of the potash in lime trass fertilizer, A. STUTZER (*Mitt. Deut. Landw. Gesell., 25 (1910), No. 43, pp. 621, 622*).—This article refers to experiments by Remy comparing a patented so-called zeolite fertilizer with phonolite, and reports pot experiments by the author to determine the efficiency of this fertilizer in comparison with potassium chlorid and sulphate on peas and barley.

The results show that taking the utilization of the potash of the chlorid as 100, that of the trass fertilizer was 17 with peas and 19 with barley.

The society for the scientific advancement of the German potash salts deposits, J. H. VAN'T HOFF (*Sitzber. K. Preuss. Akad. Wiss., 1910, XXXIX, pp. 772–786*).—An annotated list of recent papers and documents bearing upon the German potash salts deposits is given.

Experiments with phosphatic fertilizers, W. SCHNEIDEWIND and D. MEYER (*Landw. Jahrb., 93 (1910), Ergänzungsb. 3, pp. 236–247; abs. in Chem. Zentbl., 1910, II, No. 6, pp. 405, 406; Jour. Soc. Chem. Indus., 29 (1910), No. 17, p. 1070*).—Comparative pot tests of superphosphate, Thomas slag, "agricultural phosphate," and precipitated phosphate are reported, as well as studies of the rate at which these phosphates become available in the soil and of their behavior in combination with other fertilizing materials.

The soil used in these experiments was sandy clay loam mixed with about 1 per cent of lime. It had not received any phosphatic fertilizer for many years. The crops grown in the experiments were oats and mustard.

In soils with a good lime content, with only a little iron and clay, the Thomas slag as well as the superphosphates and the precipitated phosphate retained their effectiveness for many years. In the first two years the excess application of superphosphate gave better returns than the same application of Thomas slag; in the third, fourth, and fifth years both phosphates yielded the same; but in the sixth and seventh years the Thomas slag yielded more than the superphospate. Greater amounts of phosphorus were assimilated by the plants in seven years from the excess application of the superphosphate than from the Thomas slag. This greater assimilation occurred mainly during the first year. The phosphoric acid of the Thomas slag was more economically utilized by the plants than that of the superphosphate.

The so-called agricultural phosphate showed only a slight action, and only a small quantity of the phosphoric acid was available. Its efficiency as compared with that of the Thomas slag was only 18.6 per cent.

The mixing of lime nitrogen with the superphosphate reduced the efficiency of the latter.

The occurrence of phosphorus in Curaçao, Aruba, and Bonaire (*Indische Mercuur, 33 (1910), No. 42, pp. 839, 840*).—An account of the present status of the phosphate mines of these islands, and a description of small phosphate deposits discovered in 1909 near Banki Jessurun, Aruba, are given. Samples of the new deposits contained about 77 per cent of calcium phosphate.

Experiments with lime and magnesia, D. MEYER (*Landw. Jahrb., 39 (1910), Ergänzungsb. 3, pp. 254–298, fig. 1; abs. in Chem. Zentbl., 1910, II, No. 6, p. 406; Jour. Soc. Chem. Indus., 29 (1910), No. 17, p. 1071*).—The subjects investigated in these experiments were the relation of the yield of crops to the ratio of lime and magnesia in the soil, the action of increased applications of magnesium and sodium salts on the growth of plants, lime content and soil reaction in their relation to the need of lime in the soil, the action of different lime and magnesia fertilizers on acid soils, and the determination of the acidity of soils.

The soils used included clay loam, sandy, and loam soils. The crops grown included buckwheat, oats, mustard, clover, and potatoes. Detailed data are given for each crop.

Correction of an excess of magnesia applied as fertilizer reduced the yield of both buckwheat and oats. No definite relation between the yield of the crop and the ratio of lime and magnesia in the soil was established.

Magnesium sulphate, magnesium chlorid, and sodium chlorid, with a high magnesia content in the soil, gave an increased yield with cereals but not with hoed crops and forage plants. With the larger applications (2 per cent) the action of the chlorids was more detrimental than that of the magnesium sulphate. The smaller the lime content and the lighter the soil the greater was the reduction of the yield.

To determine the need of lime in a soil not only the lime content but also the reaction of the soil is important. Neutral soils with low content of lime are sometimes not benefited by applications of lime and the same is true of acid soils with higher lime content, although the lime is beneficial in improving bacteriological conditions.

Calcium and magnesium carbonates had a beneficial effect on the yield of red clover, mustard, and potatoes on an acid soil deficient in lime, whereas gypsum reduced the yield.

On the alleged refutation of the lime factor theory, O. LOEW (*Landw. Jahrb., 39 (1910), No. 3, pp. 335–343*).—The author discusses recent work by Hager, Gössel, Doyarenko (E. S. R., 15, p. 127) and de Ruijter de Wildt (E. S. R., 18, p. 532), which led to conclusions contrary to his own views as to the importance of a certain ratio between lime and magnesia in the soil. He explains why in his opinion the work of these investigators does not refute his theory.

Fertilizers and their use, J. T. WILLARD, C. O. SWANSON, and R. C. WILEY (*Kansas Sta. Bul. 169, pp. 37–97*).—This bulletin gives the main provisions of the state fertilizer law, reports analyses of 52 samples of fertilizers collected for inspection in the State, explains the terms relating to fertilizers, describes materials used in fertilizers, and discusses soil analysis and other means of determining the fertilizer requirements of soils, including physical tests, study of natural vegetation, and methods of making fertilizer experiments.

The author is of the opinion that "a thorough chemical analysis of a soil is indispensable to any comprehensive study of its condition and probable durability. Such chemical analysis may not be sufficient alone to give positive indications concerning the present productiveness of the soil, or its needs in respect to fertilizers. Chemical investigation directed toward certain specific points may be of great value in respect to a given soil. Laboratory tests of a purely physical character afford little if any information that can not be obtained better by examination of the soil in its natural condition and position. The immediate fertilizer requirements of a soil are best ascertained by means of systematic fractional fertilization of different crops."

The bulletin also deals with the fertilizer constituents and requirements of different crops, the valuation of fertilizers, fertilizing constituents in food consumed by domestic animals, and the selection and home mixing of fertilizers. Tables are included showing the composition of standard fertilizing materials, data for calculating the fertilizing constituents in different mixtures and the amounts of fertilizers to apply, and the relation between phosphorus and phosphoric acid, potassium and potash, nitrogen and ammonia, and calcium and lime for certain amounts containing equal quantities of the elements named.

Commercial fertilizers, J. S. Burd (*California Sta. Bul. 206, pp. 51*).—This bulletin reports the results of inspection work (including analyses and valuations) of the California Fertilizer Control for the fiscal year ended June 30, 1910.

Tabulated analyses of commercial fertilizers, W. Frear (*Penn. Dept. Agr. Bul. 189, pp. 71*).—This bulletin gives the results of fertilizer inspection in Pennsylvania from August 1 to December 31, 1909.

[Fertilizer manufacturers and importers and licensed fertilizers in Pennsylvania] (*Penn. Dept. Agr. Bul. 191, pp. 37*).—This is a list of fertilizer manufacturers and importers and of the brands of fertilizers which were licensed for sale in Pennsylvania during 1910.

AGRICULTURAL BOTANY.

The plant life of Maryland, F. Shreve, M. A. Chrysler, F. H. Blodgett, and F. W. Besley (*Md. Weather Serv. Spec. Pub., 3 (1910), pp. 533, pls. 39, dgms. 3, maps 12*).—This is an ecological study of the plant life of Maryland in which the influence of climate and physiography on the occurrence and distribution of plants is shown. Chapters are also given pointing out the relation of natural vegetation to crop possibilities, the agricultural features of Maryland, and the forests and their products.

Additional notes on the number and distribution of native legumes in Nebraska and Kansas, J. A. Warren (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 70, pp. 8*).—These studies are in continuation of those previously reported (E. S. R., 21, p. 424) and were made to determine whether all the native legumes are concerned in nitrogen gathering.

Practically all the prairie species of the region investigated have been examined and nodules found in abundance in every one, although they seemed to be more numerous on some species than on others. In general, there seemed to be many more nodules on annuals in proportion to the size of the roots than on perennial plants.

The author notes the occurrence of nodules on the buffalo berry (*Lepargyræa argentea*). Analyses of the material showed the roots to contain 0.43 per cent nitrogen, while the nodules gave 2.31 per cent. This large increase in nitrogen in the nodules, together with the fact that bacteria have been isolated from them, indicates that this plant can be considered as a nitrogen-gathering one.

The indigenous species of cereals found in Palestine and Syria, A. Aaronsohn (*Verhandl. K. K. Zool. Bot. Gesell. Wien, 59 (1909), No. 10, pp. 485–509*).—The author reports having found indigenous to Palestine and Syria *Triticum dicoccoides*, *T. monococcum ægilopoides*, *Hordeum spontaneum*, and *Secale montanum*, which he believes to be the prototypes from which were developed our races of cultivated wheat, barley, and rye. A previous account of his discoveries has been noted elsewhere (E. S. R., 23, p. 533).

The use of the spectroscope in the study of plant life, G. Henslow (*Jour. Roy. Hort. Soc. [London], 36 (1910), No. 1, pp. 82–97*).—The author contributes to the study of the relative effects of different parts of the solar spectrum on the transpiration of plants, the experiments showing the effect on transpiration in comparison with the loss of water by evaporation.

After several attempts the author finally adopted the plan of growing small plants in miniature pots, covering them with rubber sheeting, which was bound about the stem of the plant. This prevented evaporation from the surface, and loss of weight was due to transpiration alone.

The experiments were made with a considerable number of plants representing different families. The results are held to corroborate those of Wiesner, who showed that transpiration is mainly effected by the red, blue, and violet rays, while the yellow and green rays, which are optically the brightest, are less able to effect transpiration, even if they do not hinder it.

An atmograph, W. L. EIKENBERRY (*Bot. Gaz., 50 (1910), No. 3, pp. 214–218, figs. 4*).—A description is given of a form of apparatus designed to give a continous record showing the maxima and minima of evaporation and transpiration.

Transpiration experiments with the corn plant, T. A. KIESSELBACH (*Nebraska Sta. Rpt. 1909, pp. 125–139, figs. 2, dgms. 2*).—A preliminary report is given of experiments carried on with the corn plant to determine if possible some practical means for reducing the amount of water that the plant must absorb for normal growth. Forty plants in two series were grown, one of which was grown in loam watered with well water, while the other was grown in sand to which a complete nutrient solution was added. In the first series the object was to determine the relation, if any, between transpiration and the water content of the soil, while in the second a study was made of the relation of soil fertility to the quantity of water transpired in producing a given dry weight. A special form of pot was devised for growing the plants.

It was found that nearly the same amount of water was transpired per gram of dry weight in all saturations except where only 20 per cent saturation was maintained. Where the saturation of the soil varied from 40 to 98 per cent the amount of water transpired per gram of dry matter varied from 224 to 242 grains. Where different strengths of nutrient solution were added to the sand cultures, there was little difference in the amount of water used per gram of dry weight. The strongest solution, 0.6 per cent, proved too strong for normal development, and the amount of water required decreased slightly with an increase in the strength of solution.

Summarizing his investigations, the author states that the quantity of water consumed by similar corn plants in producing a given yield can not be materially affected by varying the water content of the soil, other things being equal. When the soil is dry, somewhat less water is used in producing a given dry weight, but the yield is also decreased.

There appeared to be little or no stomatic regulative control which would adjust the rate of transpiration according to the external conditions. The transpiration rate was found to vary with the changes in the several climatic factors, relative humidity of the air being the chief among these.

The transpiration curve is fairly parallel with the evaporation curve, and it is possible that by knowing the rate of evaporation from a free water surface the transpiration requirements may be approximately determined.

The root development in the plants was found to be proportionately greater in dry than in wet soil, so that plants which make their early growth in dry soil may be expected to better withstand a later period of drought for the reason that they would have a greater absorbing surface exposed to the soil particles.

Experiments on exosmosis in plants, F. CZAPEK (*Ber. Deut. Bot. Gesell., 28 (1910), No. 5, pp. 159–169; abs. in Bot. Gaz., 50 (1910), No. 3, pp. 234, 235*).—A preliminary report is made of investigations conducted to determine the permeability of the plasma of plant cells to various substances, and the critical concentration for securing permeability was determined.

On the physiological processes in the sprouting of plants, H. MÜLLER and O. SCHNEIDER (*Landw. Jahrb. Schweiz, 24 (1910), No. 4, pp. 235–243*).—The results are given of experiments on respiration, sugar storage, enzyms, etc., of tubers and seeds when subjected to a temporary heating (wet or dry) at from 18 to 40° during their dormant periods.

The physiological significance of certain glucosids, T. WEEVERS (*K. Akad. Wetensch. Amsterdam, Proc. Sect. Sci., 12 (1909), pt. 1, pp. 193–201; abs. in Bot. Centbl., 113 (1910), No. 17, pp. 441, 442*).—A study was made of arbutin, the glucosid which occurs in various species of Ericaceæ. This glucosid is said to play the part of a reserve material and is principally deposited in the leaves. With the development of the young shoots the amount of arbutin diminishes and that of hydroquinone increases for a time and diminishes as soon as assimilation begins in the young leaves.

In studies of different parts of the pear tree a glucosid was found which is believed to be probably identical with arbutin, and an enzym isolated from the young shoots rapidly hydrolyzed this glucosid into glucose and hydroquinone. The glucosid was found to increase during the day and to diminish during the night. During the summer it was deposited in the bark, to be used in the formation of new shoots in the spring.

From young shoots of *Salix purpurea* a salicin-splitting enzym, salicase, was obtained, and an identical substance was isolated from *Populus canadensis*. This is not considered identical with emulsin or amygdalase.

From young shoots a mixture of enzyms was observed. It contained catalase and two other oxidases, which differ from laccase and tyrosinase. From their typical reactions these have been named saligenolase and catecholase.

Studies were made of salicin and populin isolated from shoots. Populin was found to be formed in large quantities in the normal shoots but wholly absent in the etiolated ones.

The examination of a number of species of Populus showed that they contain a considerable quantity of saccharose, which plays the part of a reserve material.

The presence and utility of boron in plants, H. AGULHON (*Ann. Inst. Pasteur, 24 (1910), No. 4, pp. 321–329*).—This is a summary of work reported elsewhere (E. S. R., 23, p. 230), in which the author shows that boron is a very common constituent of plants and that it can be used by the higher plants in promoting their growth.

The action of useful and injurious stimulants on the respiration of plants, N. N. IVANOV (*Izv. Imp. Akad. Nauk (Bul. Acad. Imp. Sci. St.-Pétersb.), 6. ser., 1910, No. 7, pp. 571–581*).—In continuation of previous investigations (E. S. R., 23, p. 230), the author has carried on experiments with wheat seedlings and with etiolated plants of *Vicia faba* to determine the action of quinin hydrochlorid, sodium selenite, potassium cyanid, phloroglucin, arbutin, salicin, etc.

In summing up the results of these experiments, as well as those previously described, the author claims that living plants may be stimulated by nutritive substances as well as those which prove injurious. The stimulation in both cases results in increased respiration, and but little difference can be observed whether the stimulant is a nutritive or a poisonous one. Phosphates, which have been previously shown to have little or no influence on the respiration of living plants, strongly stimulate the respiration when the plants have been killed. Poisonous substances, however, strongly excite the respiration of living plants, while they have little influence on the respiration of those that have been killed.

The effect of these different substances on the living protoplasm, as shown by the respiration of plants, furnishes a means of distinguishing between useful and injurious stimulants.

The action of vapors on green plants, M. Mirande (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 7, pp. 481–483*).—According to the author, it has been known for some time that etherization, freezing, ultraviolet rays of light, drying, etc., will cause the blackening of plant tissues and, under certain conditions, the liberation of volatile substances that have been previously localized in the plant but are set free through the agencies mentioned.

A study has been made of the action of numerous substances on the blackening of the cherry laurel and on the liberation of hydrocyanic acid, which is given off from the leaves of that plant. Various hydrocarbons, alcohols, phenols, acids, ethers, aldehydes, cetones, amins, and amids were tested, some of which blackened the plant and liberated hydrocyanic acid, others caused a change in color but no acid was set free, while still others showed no effect whatever.

The property of blackening plants and liberating volatile substances is said to be possessed by various organic compounds the stereochemic structure of which differs widely.

Investigations on the blackening of leaves, L. Maquenne and E. Demoussy (*Bul. Mus. Nat. Hist. Nat. [Paris], 1910, No. 1, pp. 37, 38*).—Attention is called to the fact that leaves are often blackened under the influence of electric light, and the authors have carried on investigations to determine the cause of this phenomenon.

Plants were subjected to the action of a mercury lamp, the light of which is very rich in ultraviolet rays. When plants with a thin epidermis were exposed to this light the leaves were blackened within 2 or 3 hours, while if the epidermis was rather thick it required 10 to 12 hours to produce such an effect. The action of the ultraviolet rays seems to result in the destruction of the protoplasm of the cells of the plants, and the effect of these rays on plants is quite similar to that on animals, micro-organisms, fungi, etc.

Heat was found to exercise a similar effect. Leaves of the fig, lilac, privet, and aucuba when plunged in water at temperatures of 65 to 70° for half a minute turned black in about an hour. If placed in boiling water for a second a similar effect was produced, but if they were allowed to remain for 2 minutes, blackening did not occur except in the case of the aucuba.

The experiments seem to indicate that the action is a diastatic one and is generally due to the effect produced on the oxidase following the destruction of the protoplasm.

Some observations on catalase, C. O. Appleman (*Bot. Gaz., 50 (1910), No. 3, pp. 182–192, fig. 1*).—During the course of an investigation on the physiological behavior of enzyms in the after-ripening of the potato tuber, the author found it necessary to investigate methods for the quantitative determination of catalase in this organ. After giving an account of the distribution and function of catalase, the methods adopted are described at considerable length.

It was found that there was an insoluble and a soluble catalase in the potato which could be separated by ordinary filter paper, approximately 50 per cent passing through it. None, however, would pass through a Chamberland-Pasteur filter.

Potato catalase was found to be limited in its effect on the decomposition of hydrogen peroxid, a given amount of catalase apparently being required to decompose a definite amount of hydrogen peroxid. The catalase activity was found to bear a relation to the respiratory activity of the potato, decreasing under the same conditions as did the respiration.

The physiology of lipoids, W. Palladin (*Ber. Deut. Bot. Gesell., 28 (1910), No. 5, pp. 120–125*).—A report is given of investigations conducted with wheat seedlings to determine the physiological rôle of lipoids in plants.

The respiration of living and dead plants was compared, and this function was found to vary with the different extractives, the depression depending upon the proportion of phosphorus in the extractives. The action of the lipoids is held to be due to their phosphorus content.

Nuclear phenomena of sexual reproduction in algæ, B. M. DAVIS (*Amer. Nat., 44 (1910), No. 525, pp. 513–532*).—In a paper read before the Botanical Society of America, the author discusses the present status of our knowledge concerning the nuclear phenomena of sexual reproduction in algæ.

Nuclear phenomena of sexual reproduction in fungi, R. A. HARPER (*Amer. Nat., 44 (1910), No. 525, pp. 533–546*).—In a paper read before the Botanical Society of America, the author summarizes the results of recent investigations on sexual reproduction in fungi.

The chemistry of the higher fungi. V, The maize smut (Ustilago maydis), J. ZELLNER (*Monatsh. Chem., 31 (1910), No. 6, pp. 617–634*).—The results are given of a series of tests on the chemical substances found in the dried spores of *U. maydis*. Twenty-four substances were found, including oleic acid, fixed fatty acids, volatile fatty acids, lecithin, glycerin, 2 resins, sclerotinic acid, phlobaphene, tannin, mannit, erythrite, glucose, trimethylamin, ustilagin, a gummy carbohydrate, a carbohydrate soluble in alcohol, a chitinous substance, albuminoid substances, an invert ferment, a fat splitting ferment, and amanitol.

The chemistry of the higher fungi. VI, The chemical relation between the higher parasitic fungi and their host, J. ZELLNER (*Monatsh. Chem., 31 (1910), No. 6, pp. 635–641*).—In discussing the chemical composition of symbionts it is stated that the chemical constituents of host and parasite are usually very different, although the substance from the host passes over unchanged into the parasite, where it is quickly changed to a different substance, depending on the type of parasite and its substratum. The interaction of the 2 symbionts on each other may result in one of three things: (1) The fungus may draw its nutriments from the substratum (host) and leave therein another substance useful to the host as in Mycorrhiza, fungi, and lichens; (2) the fungus may sap its host without leaving either a beneficial or a noxious substance; or (3) the fungus may poison its host as do certain bacteria, *Claviceps purpurea*, etc., by leaving certain injurious substances in the substratum. As to the chemical processes that occur in these fungi, but very little is definitely known.

The behavior of bacteria in a nitrous oxid atmosphere, A. MAASSEN and SCHÖNEWALD (*Mitt. K. Biol. Anst. Land u. Forstw., 1910, No. 10, pp. 32–34*).—The results are briefly given of culture experiments in an atmosphere of nitrous oxid, with *Actinomyces rosaceus*, *Azotobacter chroococcum*, root tubercle bacteria, *Bacillus præpollens*, *B. pyocyaneus*, *B. subtilis*, *Bacterium coli commune*, *Vibrio phosphorescens*, an anaerobic spore-forming bacillus from cow manure, and the bacteria of a garden soil. It was found that the nitrous oxid was not injurious to any of these bacteria, but at the same time there was no evidence that any of them was able to obtain its needed oxygen or nitrogen from it.

Nitrogen gain and loss in cultivated soils, A. KOCH (*Mitt. Deut. Landw. Gesell., 25 (1910), No. 12, pp. 173–175; abs. in Centbl. Bakt. [etc.], 2. Abt., 27 (1910), No. 22–25, pp. 633, 634*).—The author discusses the gain or loss in fixed nitrogen in the utilization of sodium nitrate by soil bacteria and the value of cellulose as a source of energy for nitrogen-fixing bacteria.

It was shown that if the soil is very damp free nitrogen will be liberated from the nitrate of soda, but in well-drained and aerated soils this nitrate will be utilized in forming albuminoid nitrogen by the bacteria. It was found that cellulose as well as sugar and starch was available as a source of energy in nitrogen fixation, as was evidenced by an experiment in which from 100 gm.

of earth mixed with paper and infected with stable manure 29 mg. of nitrogen was obtained.

The adaptation of the plant to the soil, A. D. HALL (*Jour. Roy. Hort. Soc. [London], 36 (1910), No. 1, pp. 1–21, figs. 11*).—These papers are the third and fourth lectures in a series founded in honor of Dr. Maxwell T. Masters, and in them the author discusses the factors in the soil which are believed to influence the distribution of plants. The questions involved are held to be fundamental in plant nutrition, and some of the difficulties attending attempts to correlate the composition of the soil with the plant growth are pointed out.

Alterations in the development and forms of plants as a result of environment, G. KLEBS (*Proc. Roy. Soc. [London], Ser. B, 82 (1910), No. B 559, pp. 547–558*).—This is a lecture delivered before the Royal Society in which the author gives the results of some of his experiments upon the influence of environment on plants, the effect of light, moisture, and other factors being described.

Hybridization methods in corn breeding, G. H. SHULL (*Amer. Breeders Mag., 1 (1910), No. 2, pp. 98–107, fig. 1*).—The author calls attention to a description of a method of hybridizing corn given in Bulletin 25 of the Illinois Station (E. S. R., 4, p. 904) which he says does not differ materially from the methods described by E. M. East and by G. N. Collins (E. S. R., 21, p. 427).

After discussing these various methods of corn breeding, the author describes some of his experiments and summarizes his investigations, which have been conducted for a number of years. He has come to the conclusion that there are many distinct biotypes of corn continually mingled together in complex hybrid combinations, and that there is a stimulating effect of heterozygosis. This is shown, it is said, by the fact that the progeny of every self-fertilized corn plant is inferior in size, vigor, and productiveness as compared with the progeny of a normally cross-bred plant derived from the same source. The decrease in size and vigor which accompanies self-fertilization is said to be greatest in the first generation, and to become less and less in each succeeding one until a condition is reached when there is probably no more loss of vigor. A cross between plants belonging to two self-fertilized families results in a progeny of as great vigor, size, and productiveness as are possessed by families which have never been self-fertilized.

The reciprocal crosses between two distinct self-fertilized families are equal and possess the characters of the original corn with which the experiments were started. The F_1 from a combination of plants belonging to certain self-fertilized families produces a yield superior to that of the original cross-bred stock. The yield and quality of the crop produced are functions of the particular combination of self-fertilized parental type, and these qualities remain the same whenever the cross is repeated. The F_1 hybrids are no more variable than the pure strains which enter into them, but the F_2 show much greater variation than F_1. The yield per acre of the F_2 is less than that of the F_1.

Twin hybrids (Œnothera læta and Œ. velutina) and their anatomical distinctions, F. M. ANDREWS (*Bot. Gaz., 50 (1910), No. 3, pp. 193–201*).—A study of twin Œnothera hybrids, together with comparisons with *Œ. lamarckiana* and *Œ. biennis*, was made. From this the author concludes that the twin hybrids *Œ. læta* and *Œ. velutina* show themselves by their foliage and flowers, and the greater density and character of the pubescence in *Œ. velutina*, as well as the form of the cells, to be distinct, and in so far as they have been investigated, constant forms.

The mutation theory: A criticism, G. HENSLOW (*Jour. Roy. Hort. Soc. [London], 36 (1910), No. 1, pp. 144–148*).—The author gives an account of the conditions under which the various mutations of *Œnothera lamarckiana* described by de Vries were produced. He expresses the conviction that the specific characters described for the various species are simply individual variations due to a tendency to degeneration in consequence of the plants having been transferred from a xerophytic (sandy) environment to a soil supersaturated with manure.

FIELD CROPS.

[Field crops work at the North Platte substation] (*Nebraska Sta. Rpt. 1909, pp. XIV–XVI*).—During the 4 years beginning 1906, summer-tilled land produced an average of about 50 bu. per acre. Adjoining fields not summer tilled yielded from 20 to 24 bu. per acre, except in the unusually wet season of 1906, when they produced 41 bu. per acre. The middle of September proved the best time for sowing winter wheat. Durum wheat varieties yielded from 26.5 to 33.6 bu. per acre in 1908 and proved much superior to the local varieties generally used. No other variety excelled common barley with its yield of 21.4 bu. per acre. Among 12 oat varieties, Kherson produced 42 bu. per acre and Burt and Texas Red 38 bu. each.

Report on the Aligarh Agricultural Station of the United Provinces of Agra and Oudh for the year ending June 30, 1910, A. E. Parr (*Rpt. Aligarh Agr. Sta. United Prov. Agra and Oudh, 1910, pp. 5+11, pl. 1*).—American cotton sown early with irrigation produced nearly twice as great a yield as that sown later with the rains, while the local varieties showed little difference. The local varieties gave practically equal yields when sown broadcast as when sown in rows 2 ft. apart. Among local varieties Bisawar produced the highest yield, 411 lbs. per acre, but was only moderately high in lint percentage. Other work reported dealt with plant selection in cotton tests, local adaptability of groundnuts, rates of sowing maize, and variety tests of sugar cane and maize.

Variety tests of wheat and oats, J. L. Burgess, F. T. Meacham, and R. W. Collett (*Bul. N. C. Dept. Agr., Aug. 1910, Sup., pp. 11*).—Among wheat varieties tested at the Iredell Farm in 1910, Fulcaster and Miller Choice stood first with yields of 26.1 and 25.7 bu. per acre respectively, while Culberson and Apler oats yielded 51 and 46 bu. per acre respectively when sown in the fall, and Hood Mammoth and Burt Ninety Day stood first among the spring sown oats with yields of 40 and 34.3 bu. per acre respectively. Six varieties produced an average yield from fall seeding much above that of the same varieties when sown in the spring. At the Buncombe Test Farm, Merridy and London native varieties of wheat yielded 14.8 and 12.9 bu. per acre respectively.

Winter fodders for the south coast, R. N. Makin (*Agr. Gaz. N. S. Wales, 21 (1910), No. 8, pp. 686–690, figs. 4*).—The author reports results of tests of different varieties of wheat, oats, rye, and barley for winter fodder.

Report on rice and cotton investigations in China and Japan, F. G. Krauss (*Hawaii. Forester and Agr., 7 (1910), Nos. 5, pp. 143–152, pls. 3; 6, pp. 186–193, figs. 6; 7, pp. 210–220, figs. 6; 8, pp. 231–238; 9, pp. 271–275*).—These articles report the methods used in rice and cotton production in China and Japan, the experimental methods in use at the stations of these countries, and some general conclusions based upon their investigations.

Trial of leguminous plants from Ceylon (*Agr. Gaz. N. S. Wales, 21 (1910), No. 8, p. 670*).—The results are briefly reported of a test of *Crotalaria striata*, *C. hirsuta*, *C. laburnifolia*, and *Indigofera rubra*. The two last-named failed to germinate. The first-named yielded a small amount of thick, coarse fiber and possessed no commercial value, although grown for its fiber in Chutia Mazpur.

Cold resistance of alfalfa and some factors influencing it, C. J. Brand and L. R. Waldron (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 185, pp. 80, pls. 4, fig. 1*).—The experiments reported were conducted at Dickinson, N. Dak., in cooperation with the North Dakota Station.

The observations indicate that the most destructive conditions are lack of sufficient snowfall, successive thawing and freezing, and excessive moisture in autumn, especially when followed by dry winters. The capacity to react promptly to stimuli producing dormancy is perhaps the most important quality in producing hardiness in alfalfas and clovers. Variation in the percentage of hard seed accompanies difference in hardiness, but in a way that is not fully understood. Well inoculated plats were uninjured by a frost which had marked effect on slightly inoculated plats.

Of 68 strains tested during the winter of 1908–9 42 lost 80 per cent or more by winterkilling and 3 lost 10 per cent or less. All European alfalfas lost 79.5 per cent or more, those from Arabia lost 100 per cent, those from Turkestan an average of 72.3 per cent, those from Mongolia 33.5 per cent, those from Canada 45.4 per cent, those from Mexico 85 per cent, and those of 18 American strains 83.3 per cent, while the hardiest American strain suffered to the extent of 43.7 per cent. Grimm seed from Fargo, N. Dak., and Clearwater, Minn., winterkilled only 2.8 and 7 per cent respectively, while Turkestan seed from Highmore, S. Dak., winterkilled 9.2 per cent.

In general the observations recorded indicate that good tillage and suitable strains of seed in favorable winters are the controlling factors in successful alfalfa production on the average fertile Northwest soils. Inoculation determines success or failure. If considerable growth was left on the field in autumn strains of inferior hardiness endured severe conditions, probably because of exhaustion of soil moisture and the protective snow covering held over the crowns by the plants. A thin stand meant high winterkilling save in the hardiest varieties. The experiments indicate that the most important cause of failure in practice is the use of seed from the wrong regions. The Mongolian alfalfa proved the hardiest newly imported strain, probably because the crowns were the most deeply set in the soil. It is suggested that the long endurance of stands of the Grimm strain may be due in part to its power of putting out new roots after the taproot has been broken.

The importance of the inoculation of alfalfa on Nebraska upland soils, F. J. Alway (*Nebraska Sta. Rpt. 1909, pp. 3–20, figs. 2*).—The results of investigations elsewhere are summarized with references to the authorities consulted. A discussion of the recognition of inoculated plants is followed by a statement of observations made in alfalfa fields in various counties in Nebraska.

Crimson clover culture, A. E. Grantham (*Delaware Sta. Bul. 89, pp. 36, figs. 4*).—Experiments with fertilizers for crimson clover indicated that acid phosphate and potash singly or in combination produced marked advantages, but that nitrate of soda did not greatly increase the growth. Suggestions are given for seed production, harvesting, and the detection and removal of weed seed.

Replies to letters sent out to several hundred Delaware farmers indicated that those replying have grown crimson clover for an average period of 10 years, that the average area devoted to the crop was 16.6 acres, that moderately good sandy loam is the predominating soil, and that July and August are the best months and September the latest safe month for sowing. Crimson clover is usually grown after another crop. In 95 per cent of the cases the seed is covered, in 73 per cent not more than 15 lbs. per acre is sown, 80 per cent of spring sowings fail, winterkilling results in a majority of cases, fertilizers are rarely applied at time of sowing in corn, liming is successful mainly on clay soils, and acid phosphate and potash are most prominently mentioned as fertilizers. About 83 per cent of those replying on this point cut the crop for hay at or just before full bloom, the average yield of hay being 2.12 tons per acre with an average farm value of $10.60 per ton, while the average seed yield is 7½ bu. per acre valued at $3.80 per bushel. Corn could in most instances be matured after the crop of crimson clover and was regarded by the majority as the best crop for crimson clover sod. The majority of the replies indicated that crimson clover hay equalled or excelled cowpea or red clover hay, caused no injurious effects, and excelled cowpeas for soil improvement. The crop was apparently satisfactory as silage where tried, was universally reported equal to or better than red clover as pasture, and increased the productiveness of the soil by an average of 66 per cent. Fifty per cent of the growers held that the crop gave as good fertilizer results when cut as when plowed under, while 86 per cent state that a noticeable increase in yield follows a short growth, and 94 per cent of the replies on this point indicate that it succeeds on land that fails to produce red clover well.

A digest is also given of work with crimson clover at several stations.

The nitrogen content of inoculated and uninoculated alfalfa plants, F. J. ALWAY and R. M. PINCKNEY (*Nebraska Sta. Rpt. 1909, pp. 33, 34*).—It was usually possible to determine by the deeper green color the plants having nodules. The inoculated plants analyzed were invariably much higher in nitrogen content of stalks and roots.

The curing and testing of seed corn, R. A. MOORE (*Wisconsin Sta. Circ. Inform. 18, pp. 12, figs. 10*).—Directions for curing small and large lots of seed corn and making germination tests accompany plans for a corn-curing house.

Manchurian millets, A. H. HAYWOOD (*Agr. Gaz. N. S. Wales, 21 (1910), No. 8, pp. 691–693, figs. 3*).—At the Grafton Experimental Farm white and yellow varieties of Hsiao-mi Manchurian millet produced estimated yields of 49 bu. and 52 bu. 48 lbs. of seed per acre, respectively, when drilled in rows 2½ ft. apart.

Trial of varieties of potatoes, 1909–10, G. VALDER (*Agr. Gaz. N. S. Wales, 21 (1910), No. 9, pp. 737–745, pls. 6, figs. 2*).—Brief descriptions of each of the 8 varieties of potatoes tested are given and the yields of each variety on each of the test farms stated in a table.

The average yields following applications of 4 cwt. of potato fertilizer per acre showed "a gain by manuring of about 15 cwt. of potatoes per acre at a cost of about 32 s." In another test on red soil at Wollongbar, 500 lbs. per acre of superphosphate produced a slightly greater yield than 500 lbs. of bone dust and each produced nearly twice the yield obtained on unmanured plats. Whole seed produced a slightly greater average yield than cut seed, but the various tests were so contradictory "that no definite rule can be laid down."

Wheat growing and its present day problems, E. J. RUSSELL (*Sci. Prog. Twentieth Cent., 5 (1910), No. 18, pp 286–301, fig. 1*).—On the Broadbalk Field at Rothamsted, the increase in wheat yield for each 43 lbs. of nitrogen added varied from 1,172 to 1,885 lbs. of straw and grain. The first increment of nitrogen increases the root system as well as the amount of material that each unit of root surface can take up. The second increment of nitrogen produces a larger increase than the first increment but this does not go on indefinitely. Other topics dealt with are the relation between precipitation and wheat yield, quality and composition of grain, economic problems of wheat production, and the part played by the soil.

Wheat experiments, season 1909, G. VALDER (*Agr. Gaz. N. S. Wales, 21 (1910), No. 8, pp. 671–678, figs. 2*).—A table presents the results of variety and manurial tests of wheat on a number of different farms.

In 31 trials, "Federation easily takes first place with an average of 24 bu. 23 lbs." In each of the geographical divisions in which it was tested this variety excelled in yield the local varieties. An application of superphosphate produced an apparent increase in yield of nearly 2 bu. and the addition of a small quantity of sulphate of potash appeared desirable on soils that had long been under cultivation.

Federation wheat, from farmers' and millers' point of view, H. Ross (*Agr. Gaz. N. S. Wales, 21 (1910), No. 8, pp. 694–696*).—Federation wheat proved superior in yielding qualities, ease of stripping, stiffness of straw, and storm resistance. On each of 5 farms it excelled in yield the local wheats. On the Wagga Experiment Farm it has averaged 22 lbs. per acre more during the past 8 years than any other variety grown for an equal length of time. The opinions of millers as to the color of its flour varied somewhat but none reported discrimination against it, while one was "inclined to give 1 d. per bushel more for Federation."

Breeding for type of kernel in wheat, and its relation to the grading and milling of the grain, H. F. Roberts (*Kansas Sta. Bul. 170, pp. 99–138, figs. 16*).—The author presents in tabular and graphic form the results of studies of the packing quality and volume weight of 52 races of wheat.

Especial attention was given to the ratio of length to width. In 27 races this ratio varied from 1.88 to 2.14 and in the remaining 25 races from 2.15 to 2.84. The data presented lead the author to conclude that "a difference of at least 3 lbs. to the bushel in the test weight can be gained by breeding for short-kerneled races of wheat. When other factors than ratio are considered it has been found that as much as 7 lbs. per bushel may be gained by breeding for specific types of kernel." The superior samples were invariably those having the lower ratio of length to width. When the ratio of length to width remains constant a higher kernel-volume is generally accompanied by higher bushel-weight, "except in the higher ratios where the reverse is the case."

The author concludes that the grower should produce a wheat that will test high in bushel weight and that the just and scientific grading system will give preference to wheat having a high percentage of grain in the packed measure. He suggests a system whereby wheat with a narrow, shallow crease will receive the advantage justified by its lower bran percentage. A 1,000 cc. graduate may be packed with grain and the volume of air contained measured by pouring in alcohol. The cost per test is 0.8 ct. where 95 per cent of alcohol is used. Experiments "indicate that probably 70 per cent and possibly 50 per cent alcohol can be used."

The relation of size, weight, and density of kernel to germination of wheat, J. G. Lill (*Kansas Sta. Circ. 11, pp. 8*).—In an experiment to determine the relation of size, weight, and density of wheat kernel to germination 246 heads furnished 7,679 kernels. The kernels heavier than the average exceeded the average germination by 0.75 per cent, while the germination of kernels lighter than the average was 1.19 per cent below the average. The difference between the germination of the larger and smaller kernels as separated by sieves was slight and inconstant but the smallest kernels usually showed the poorest germination. Germinating ability varied directly as the density.

Production of a new form in wheat, E. G. Montgomery (*Nebraska Sta. Rpt. 1909, pp. 53–61, figs. 4*).—A chart shows the pedigree for 6 generations of a cross of Turkey Red bearded and Big Frame smooth wheat beginning with 1903. The normal bearded, normal smooth, and new types as well as mixtures of types secured are graphically indicated.

In 1906 full notes were taken and the study of Mendelian characters dropped. The first unusual form occurred in 1907 when one plat developed new type A. Its straw was from 6 to 10 in. shorter and the wheat ripened a week earlier than that on the other plats. In the fall of 1907, 3 centgeners of this plat were planted and came true to the new type in 1908. Five centgeners planted from plants selected in 1907 came true to the bearded type, except for one case in which taller and later-maturing plants referred to as new type B resulted. In 1908, the new types were divided into 3 groups. Plants selected from each group came true when planted in centgeners, with the exception of less than 1 per cent of reversions to the original bearded and beardless types.

Tabular data show that normal plants selected from plats where a new type occurred for the first time produced about 51 plants of the new type out of a total of 1,650. From 31 selected type A plants a product of 2,170 plants came true except for 23 reversions to the original parent types. Five type B plants gave a product of 350 plants with 3 reversions. Composite samples from 4 plats sister to the one which produced type B produced none of this type in 1908, but in 1909 18 out of their 280 descendants were of type B.

New type A therefore appears to be a result of the crossing of Turkey Red and Big Frame wheat which remained latent 4, 5, and 6 generations, then appeared, and when planted came true to type as a mutant is supposed to do. All the other wheat crosses observed in these experiments followed Mendel's laws. This suggests that now and then a cross may act in an unusual way.

Handling wheat from field to mill, L. A. FITZ (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 68, pp. 12*).—This circular discusses methods of handling wheat, their effect on quality and market value, the relation of moisture content to test weight, and the effect of exposure to weather on soundness and changes during the sweating process in stack and bin.

The absorption of a high percentage of moisture lowers the test weight per bushel. This test weight is not regained by drying the grain.

Shock-thrashed grain direct from the machine contained 14.8 per cent of moisture and tested 55.5 lbs. per bushel. It was scarcely safe for shipment and showed an excessive loss in milling. Another sample after 18 days in the bin milled tough and caused difficulty in the removal of the bran. Stack-thrashed wheat from the same portion of the field contained 13.2 per cent moisture and tested 59 lbs. per bushel. It showed less loss in cleaning and milling and produced less bran but more "low grade," shorts, and straight flour than the shock-thrashed grain. The shock-thrashed grain after 60 days' storage had a slight advantage in the color of the bread, but the stack-thrashed grain yielded flour with a higher water absorption.

Absorption and loaf volume improved as the wheat aged, but after aging 2 months the flour from the shock-thrashed grain, which was milled immediately after thrashing, was still inferior to flour from wheat which had aged in the bin for the same length of time and no sample milled from shock-thrashed wheat equaled that from stack-thrashed wheat. The average loaf volume from the latter was 2,700 cc. as compared with 2,610 cc. from the earliest milled shock-thrashed wheat.

Although Bulletin 73 of the Bureau of Statistics, previously noted (E. S. R., 21, p. 188), indicates a difference of 23.2 cts. per acre in favor of the shock-thrashing method in cost of handling, the author estimates that the improvement in quality through stacking more than counterbalances this added cost.

Seed sterilization and its effect upon seed inoculation, T. R. ROBINSON (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 67, pp. 11*).—In these experiments 50 seeds each of alfalfa, crimson clover, garden peas, beans, wheat, corn, and radishes were used.

The germination percentage of alfalfa, bean, wheat, corn, and radish seed appeared higher after sterilization with 1 or 3 per cent of hydrogen peroxid than before but was almost invariably decreased by the use of formaldehyde and mercuric chlorid. Full strength commercial or 3 per cent hydrogen peroxid and 1 per cent hydrogen peroxid both failed to sterilize garden peas or beans by means of 10 or 60 minute applications except in the case of the 60-minute application to garden peas. All other seeds tested were sterilized by either period of application of hydrogen peroxid except in case of a 1 per cent solution on radishes. Formaldehyde or 0.5 per cent mercuric chlorid almost invariably sterilized, but 0.1 per cent mercuric chlorid completely failed in case of peas and beans and in the shorter or 5-minute application to alfalfa and corn. Treatment with formaldehyde and mercuric chlorid resulted in distorted sprouts when the seeds were germinated but affected hard-coated leguminous seeds less than the nonleguminous seeds, most of which were killed.

The residual effects were tested by attempts to grow *Bacillus subtilis* in washings from the seeds after 2, 3, or 4 rinsings. Two rinsings failed to remove hydrogen peroxid but 3 were sufficient. Seeds treated in vacuum were more perfectly penetrated by the sterilizing agent, but this advantage was more than counterbalanced by the greater difficulty experienced in removing its toxic effects before inoculation. Seeds dried in soil had a much lower number of bacteria 1, 2, or 4 days after sterilization. Culture-treated seed previously washed with sterile water were lower in number of living bacteria 1, 2, or 5 days after treatment when dried in soil or filter paper than in desiccators or open Petri dishes. The author concludes that careful seed disinfection should precede legume inoculation experiments and that metallic poisons such as mercuric chlorid are objectionable because difficult or impossible to remove from the seeds. Sulphuric acid is more readily rinsed off than mercuric chlorid, while hydrogen peroxid is still less harmful in its residual effect and is effective in eliminating bacterial contamination.

Seed testing apparatus.—A study of conditions under which our germination tests are made, H. Garman (*Kentucky Sta. Bul. 148, pp. 41–62, pl. 1, figs. 8*).—This bulletin contains two papers.

I. *Seed Testing Apparatus.*—For blue grass and other small seeds, excellent results are being obtained in germination tests by the use of an ordinary jelly tumbler on top of which is placed a bobeche or candle-drip glass. The seeds are placed in this glass on a disk of blotting paper which is kept moist by a candle wick leading to water in the jelly glass. For the purpose of controlling air pressure in removing foreign seeds and inert matter from pure seeds, a mercury gage registering 2 lbs. pressure was found helpful. It facilitates the determination and maintenance of the pressure needed to remove impurities.

II. *A Study of Conditions Under Which our Germination Tests are Made.*—Results reported with grass seed samples kept in the dark in the headhouse invariably showed a lower germination test than those treated in any other way, but with clover and alfalfa seeds the differences were of no consequence.

The control of quack grass and Canada thistles, A. L. Stone (*Wisconsin Sta. Circ. Inform. 19, pp. 13, figs. 5*).—Descriptions of quack grass and the Canada thistle are followed by directions for their eradication.

HORTICULTURE.

Report of the horticulturist, C. F. Kinman (*Porto Rico Sta. Rpt. 1909, pp. 19–23*).—A brief report on the condition of temperate climate and citrus fruits, mangoes, avocados, and miscellaneous plants being tested, together with an outline of the experiments being conducted with fruits and vegetables.

The apple, pear, plum, and persimmon trees in the station orchards have made some growth, but it is unlikely that these fruits will prove of commercial value in that locality.

Trees of improved varieties of mangoes set out in 1904 are now from 18 to 20 ft. tall and it appears that they will prove to be an excellent windbreak for the citrus orchards. The avocados in the station orchard grow fairly well until they reach a height of from 12 to 18 ft., after which they begin to sicken and slowly die. The trouble, which may be due to unfavorable soil conditions, is being investigated. Of 20 kinds of eucalypts set out, *Eucalyptus robusta, E. piperita, E. rostrata*, and *E. tereticornis* are making the most rapid growth and will be used for plantings in low, wet, waste lands.

Methods for propagating Porto Rican tropical fruits are being studied. Whip grafting young mango seedlings and grafting the *Anona cherimola* on a native stock gave promising results. *Aberia caffra, Carissa arduina*, and *Courcoupita guianensis* were successfully propagated from cuttings.

Notes on varieties of tomatoes, C. C. NEWMAN (*South Carolina Sta. Bul. 153, pp. 3–30, pls. 8*).—Tabular data on a test of over 40 varieties of tomatoes are given, showing for each variety the yield per acre in bushels of both sound and decayed fruit, the time of first ripening and last gathering, the loss in paring, the color, form, relative amount of core, average weight, seed cavity, flavor, average dimensions, and general growth behavior. A brief outline is also given of the manner in which the plants were handled before and after transplanting, together with lists of varieties recommended for early planting and for the general crop. A number of the varieties are illustrated.

Report of the fruit branch of the Department of Agriculture, Ontario, 1909, P. W. HODGETTS ET AL. (*Rpt. Fruit Branch Dept. Agr. Ontario, 1909, pp. 112, figs. 40*).—This is the usual report on the work of the fruit branch for 1909 (E. S. R., 22, p. 142). An appendix contains a report by T. B. Revett on the conditions of the grape industry in the Niagara district, including a description of cultural methods now in vogue.

The use of sulphate of iron introduced into the trunk or into the branches of fruit trees attacked with chlorosis, J. COFFIGNIEZ (*Jour. Soc. Nat. Hort. France, 4. ser., 11 (1910), Sept., pp. 554–556*).—As a result of experiments conducted during the past 3 years the author reports that he has successfully combated chlorosis in pear trees by the introduction of sulphate of iron into the wood.

The operation is performed by preference during the latter part of July. The diameter of the hole is a little less than one-tenth and its depth about one-half of the diameter of the trunk or branch operated upon, and the hole is inclined at an angle of 45° to facilitate the introduction of the sulphate, which should not be put on the bark or on the exterior portion of the sapwood. The surface of the hole is refreshed with a pruning knife and covered with grafting wax.

The author points out that when the chlorosis is due to impoverished soil or when the tree is too old, seriously diseased, or weakened by insects the effect of the sulphate of iron is only temporary.

The art of grafting and budding, C. BALTET (*London, 1910, 6. ed., pp. 238, pl. 1, figs. 108*).—The present work is a translation of the author's L'Art de Greffer. Various methods of grafting and budding are described at length and the trees, shrubs, etc., to which each mode of operation is best applied are enumerated. The work concludes with practical notes relative to the grafting of about one hundred various kinds of trees and shrubs.

[Protection of fruit crops from frost injury] (*Better Fruit, 5 (1910), No. 4, pp. 17–19, 21–26, 27–29, 33–36, 44–47, 50–52, figs. 41*).—The following articles have to do with methods of protecting fruits and vegetables from frost: Protection of Fruit Crops from Frost Injury, by O. W. Whipple (pp. 17–19); Frost Prevention in the Rogue River Valley, by P. J. O'Gara (pp. 21–26); Orchard Heating in Grand Valley, Colorado, by L. Meyer (pp. 27–29); Prevention of Frost Injury to Fruit Crops, by G. B. Bracket (pp. 33–36); Relation of Weather Bureau to Horticulture, by E. L. Wells (pp. 44–46); and Forecasting the Weather not Guess Work, by E. A. Beals (pp. 47, 50–52).

Suggestions on planting orchards, O. K. White (*Michigan Sta. Bul. 262, pp. 29, figs. 9*).—A bulletin discussing in a popular way the details of orchard planting, including selection of site and soil, preparation of soil, planting distances, methods, and operations, sterile and self-fertile varieties, pruning, after care of the orchard, and selection of varieties. Varieties of apples, crab apples, pears, peaches, plums, cherries, and quinces for the home orchard and the market are suggested, including descriptions of the tree and fruit of the principal varieties in the order of the harvesting period.

Pennsylvania model orchard plan, H. A. Surface (*Zool. Bul. Penn. Dept. Agr., 7 (1910), No. 8, pp. 227–260*).—The Pennsylvania Department of Agriculture in cooperation with various fruit growers has established a large number of model orchards throughout the State with a view to furnishing practical demonstrations of modern methods of suppressing plant pests and producing the largest amount and best quality of perfect fruits at the least necessary expense. This bulletin contains a circular of information concerning the model orchards, further explains the work to be conducted, and gives practical directions to be followed in establishing and managing orchards, together with a list of demonstration orchards already established.

The effects of planting distances on the yield of apple trees, S. Glasenapp (*Trudui Byuro Prikl. Bot., 3 (1910), No. 7, pp. 275–287, fig. 1*).—As a result of observations made on an orchard of some 504 semidwarf trees set out in 1887 and spaced 5 by 5 meters apart, the author concludes that this planting distance is too small and has a detrimental influence on the yield. In starting orchards of semidwarf trees, he recommends a distance of at least 8 meters between the rows and 6 meters between the trees in the row.

Varieties of apples for Massachusetts orchards, F. C. Sears (*Agr. of Mass., 57 (1909), pp. 42–66*).—A paper with the accompanying discussion in which the author outlines a score card for judging commercial varieties of apples and describes 17 commercial varieties of apples with the score card as a basis.

A new species of blueberry from New Jersey, K. K. Mackenzie (*Torreya, 10 (1910), No. 10, pp. 228–230*).—A new species of blueberry found in a white cedar swamp in New Jersey is named *Vaccinium cæsariense* n. sp. and described.

The East German vine industry: Its natural, economic, and cultural principles, W. Pomtow (*Der ostdeutsche Weinbau. Berlin, 1910, pp. 231, figs. 18, map 1*).—A monographic study of the grape industry in East Germany. A bibliography of the works consulted is included.

Cacao, J. H. Hart (*West India Com. Circ., 24 (1909), Nos. 282, pp. 340–345, figs. 6; 283, pp. 364–367, pl. 1, fig. 1; 284, pp. 389–391, fig. 1; 285, pp. 412–416, pl. 1, fig. 1; 286, pp. 438–441; 287, pp. 462–466, fig. 1; 288, pp. 484–487, figs. 3; 289, pp. 509–513, figs. 4; 290, pp. 533–537, figs. 6; 291, pp. 557–561, figs. 2; 292, pp. 580–583; 293, pp. 606–610, figs. 5; 25 (1910), Nos. 294, pp. 4–8, pl. 1, figs. 2; 295, pp. 29–33, fig. 1; 296, pp. 53–57, figs. 3; 297, pp. 80–83, figs. 2; 298, pp. 106–110; 299, pp. 126–130; 300, pp. 151–154; 301, pp. 175–178, figs. 2; 302, pp. 198–201; 303, pp. 226–230, fig. 1; 304, pp. 245–248, figs. 3; 305, pp. 270–273; 306, pp. 293–295; 307, pp. 315–318; 308, pp. 340–343*).—A series of articles comprising as a whole a detailed treatise on cacao and its culture. The successive articles discuss botany and nomenclature; some illustrations of pods; selection of land; nurseries; planting cacao; shading cacao; manuring; pruning cacao; diseases of cacao; fauna of the cacao field; road making and draining; picking and harvesting; shelling and breaking; cacao fermentation; drying apparatus; agricultural chemistry of cacao; temperature and climate; yield, value and prices of cacao; the land available and the value of a cacao estate; production of cacao; food value and manufacture of cacao; transport of cacao plants and seeds; miscellaneous; the health of the cacao estate; and How José Formed his Cocoa Estate, which is a reproduction at length of a little brochure published in Trinidad some years ago by an anonymous author.

Report of the coffee expert, J. W. Van Leenhoff (*Porto Rico Sta. Rpt. 1909, pp. 32–34, pl. 1*).—Weather conditions were again unfavorable for securing positive results on the various experiments with coffee (E. S. R., 22, p. 241).

In the old coffee plantation, which is unprotected by wind-breaks, the size of the berries was small and many ripened prematurely. In the new plantings, which are as yet only slightly protected by shade trees, the size of the berries was nearly normal. Emajagua (*Paritium tiliaceum*) and pavonia (*Hibiscus rosa sinensis*) are to be tried as wind-breaks to surround the coffee on exposed places. New plantings of Porto Rican and foreign coffees are doing well and the quality, especially of the Java coffees, was fine. Leaf weevils are rapidly becoming a serious menace to the coffee plantations located in the higher altitudes, and coffee leaf blight and borers in the shade trees continue on the increase.

The renovation experiments in the old coffee grove and the experiments with the new plantation were continued along the lines previously reported. The old grove yielded 2,723 lbs. of coffee as compared with 2,472 lbs. the previous year. The total cost of growing, harvesting, and preparing 100 lbs. of coffee for market in 1909 was $5.18, and the average price obtained was $11.98. The total expense per acre for the fifth year in the new 3-acre planting was $12.73. A small crop of 105 lbs. per acre harvested in 1909 was valued at $12.58, leaving a net expense of 15 cts. per acre for the year, and a total net expense per acre for the 5 years of $91.71.

The pecan and its culture, H. H. Hume (*Glen Saint Mary, Fla., 1910, 2. ed., pp. XI+195, figs. 79*).—The present edition of this work (E. S. R., 18, p. 339) has been largely rewritten to include the more recent knowledge relative to the general requirements of pecans, the behavior of varieties in different regions, improved methods of culture, and similar topics.

Ornamental trees and shrubs for Montana, R. W. Fisher (*Montana Sta. Bul. 80, pp. 4–46*).—The results of experiments in testing different kinds of ornamental trees and shrubs are reported, together with some general observations on the planting of ornamentals and the success of such plants in various parts of the State. The plants are grouped by genera and the various species are briefly discussed relative to the character of their growth and hardiness as tested on the station grounds. Lists are given of the trees and shrubs which are hardy and of those which are almost hardy and can be grown at the station.

Landscape gardening studies, S. Parsons (*New York, 1910, pp. 107, pls. 32*).—A number of landscape gardening problems undertaken by the author are herein illustrated and described.

Pollination of Spencer sweet peas, G. M. Taylor (*Gard. Chron., 3. ser., 48 (1910), No. 1241, pp. 257, 258*).—Although it is the general opinion among workers with sweet peas in England that pollination owes little or nothing to insect agencies in the old grandiflora type of sweet peas since fecundation is effected before the blossoms are fully developed, the author points out that the flower structure in the recently introduced Spencer peas is not conducive to self-fertilization, since the stigma protrudes from and rises considerably above the carinal pouch even in the bud stage before the anthers have dehisced, while the carina is open and the stigma unprotected from the weather. It is his opinion that where pollination does take place it is often caused through insect agency. Bees may prove valuable agents in assisting the work of setting a good seed crop, although isolation of different colors of flowers may be necessary if the stock is required to remain perfectly true. A number of insects which visit the Spencer peas are briefly discussed.

The application of refrigeration to the retarding of plants and the preservation of flowers, L. C. CORBETT (*Cold Storage and Ice Trade Jour., 40 (1910), No. 4, pp. 32–34*).—A paper read at the Second International Congress of Refrigeration, Vienna, 1910. The following phases are discussed: Types of structure used for retarding purposes, holding nursery stock from one season to another, classes of nursery stock which will permit of storage in retarding houses, and cold storage in floriculture.

FORESTRY.

The forest, B. E. FERNOW (*La Forêt. Quebec, 1906, pp. 149, pls. 24*).—This consists of a series of lectures on the principles of silviculture, delivered at the School of Mineralogy, Kingston, Ontario, in January, 1903.

Selection forests, M. WERNICK (*Allg. Forst u. Jagd Ztg., 86 (1910), July, pp. 229–235; Aug., pp. 269–273, pls. 2; Sept., pp. 313–321; Oct., pp. 353–360*).—A detailed study of the adaptation of the selection or single tree method of forest management to the small private wood lot, including a discussion of results secured from experimental stands. The general conclusion is reached that the selection system is well adapted for the development and maintenance of the small wood lot.

Distribution and utilization of the mangrove swamps of Malaya, F. W. FOXWORTHY (*Ann. Jard. Bot. Buitenzorg, 1910, Sup. 3, pt. 1, pp. 319–344, map 1*).—The author briefly considers the occurrence of mangrove swamps within the principal divisions of the Malayan region and gives a table of distribution and a key to the mangrove swamp species, together with notes on the distribution, common names, chief uses, and special characteristics of the different species making up these swamps.

Plantation rubber in Cochin China, P. MORANGE (*Bul. Écon. Indo-Chine, n. ser., 13 (1910), No. 84, pp. 331–346*).—A general report by the chief of the Agricultural Service in Cochin China on the various rubber plantations and the conditions affecting rubber culture in that country. Although a number of rubber species have been tested, thus far Para rubber (*Hevea brasiliensis*) alone has proved successful.

Relation between the composition of the latex of Hevea brasiliensis and the tapping process, W. R. TROMP DE HAAS (*Ann. Jard. Bot. Buitenzorg, 1910, Sup. 3, pt. 1, pp. 443–446*).—Two methods of tapping were compared, namely, V-shaped incisions and double herring-bone incisions. The latex was analyzed during different periods of the tapping to determine any variation in its composition.

The results, which are presented in tabular form, lead to the conclusion that as the tapping period advances the quantity of solid material in the latex diminishes, whereas the noncombustible matter and the nitrogenous matter increases. The V-shaped method of incision gave a slightly higher rubber content.

The growing of guayule in relation to the soil, J. E. KIRKWOOD (*Amer. Rev. Trop. Agr., 1 (1910), No. 5–6, pp. 142–158, pls. 10*).—In continuation of propagation studies (E. S. R., 23, p. 543), the results are given of an experimental study of the guayule rubber plant in its relation to the physical and chemical conditions existing in the soil where it grows spontaneously and of the effects of different soils on the plant as to its form, structure, and rate of growth. The studies, which were conducted in southern Arizona, lead to the conclusion that the guayule shrub must be grown slowly, as under desert conditions, in order to produce gum in its highest percentage. Irrigated plants produce very little gum and an amount of woody tissue larger than is usual in desert grown plants.

Wood-using industries of North Carolina, R. E. SIMMONS (*N. C. Geol. and Econ. Survey Econ. Paper 20, pp. 74, pls. 6*).—This report consists of a statistical account with discussion of those wood-using industries of North Carolina which produce finished commodities either directly from the log or from rough lumber. The tables given show the sources of such wood used, the kinds of lumber demanded by the wood-working factories, the price paid for each species, quantity consumed, and purposes for which it was used.

DISEASES OF PLANTS.

Cultures of Uredineæ in 1909, J. C. ARTHUR (*Mycologia, 2 (1910), No. 5, pp. 213–240*).—Continuing previous work (E. S. R., 22, p. 451), 345 sowings were made during 1909 from 91 collections belonging to about 70 species of rusts, 97 species of hosts being employed for this purpose.

In addition to cultures confirming previous work, successful new cultures are reported and descriptions given of the following species: *Puccinia ceanothi*, teleutospores from *Andropogon hallii* sown on *Ceanothus americanus; Gymnosporangium exiguum* n. sp., teleutospores from *Juniperus virginiana* sown on *Cratægus pringlei; G. corniculans* n. sp., teleutospores from *J. horizontalis* sown on *Amelanchier erecta* and *A. canadensis; G. trachysorum* n. sp., teleutospores from *J. virginiana* sown on *Cratægus punctata, C. coccinea* and *C. cerronis*.

Especially worthy of note are the cultures with *P. poculiformis*, in which successful cross inoculations (present and previous cultures) from various wild and cultivated grasses by way of the æcidia on barberry, were made, indicating that in the æcidial stage racial strains play no part, as the barberry acts as a bridging host between each and every other gramineous host.

A new genus of the Uredinaceæ, E. J. BUTLER (*Ann. Mycol., 8 (1910), No. 4, pp. 444–448, pl. 1*).—The author discusses the affinities of a rust on the leaves of *Olea dioica* from Bombay, India, intermediate in its generic characters between Hemileia and Ravenelia and related to Zaghouania, but differing from them and all other known Uredinaceæ to such an extent that it is made the type of a new genus and species, *Cystopsora oleæ*, a technical description of which is appended.

Contributions to the study of the sooty molds, G. ARNAUD (*Ann. Mycol., 8 (1910), No. 4, pp. 470–476*).—In a taxonomic discussion of several species of sooty molds, the author describes as new two species, as follows: *Teichospora (Capnodium) meridionale* on the branches of *Cistus monspeliensis, Citrus deliciosa, Quercus suberis*, and *Nerium oleander*, and *T. oleæ* on the branches of *Olea europæa*.

Studies on the behavior of the black rust of cereals in Russia, A. VON JACZEWSKI (*Ztschr. Pflanzenkrank., 20 (1910), No. 6, pp. 321–359, figs. 8*).—The author discusses the various stages in the life cycle of the grain rust (*Puccinia graminis*) and gives the results of experiments on the germination of the stylospores (spermatia), æcidiospores, uredospores, and teleutospores, and of cross inoculations of various wild and cultivated grasses with uredospores and acidiospores. The stylospores (spermatia) were germinated after 24 hours in the sweetish liquid which exudes in minute drops from the pycnidia, but further development after germination was not observed.

In the cultural tests on interchanges of hosts by the specialized forms of *P. graminis* the following results are reported: Uredospores from rye infected *Triticum repens*, *T. caninum*, *Dactylis glomerata*, and sparingly *Bromus secalinus* and *B. inermis*, but did not infect wheat, oats, or barley; uredospores from oats infected *Arrhenatherum elatius*, *Avena pubescens*, *Alopecurus pratensis*, and *Festuca ovina*, and sparingly *Bromus arvensis* and *Briza media*, but not rye, barley, or wheat; uredospores from wheat infected barley, *Triticum repens*, *T. caninum*, *Lolium perenne*, and *Festuca gigantea*. Uredospores from *Aira cæspitosa* were unable to infect any of the cultivated cereals or wild grasses inoculated. Uredospores from *Agrostis alba* infected wheat, oats, rye, barley, *Triticum repens*, *Dactylis glomerata*, *Bromus secalinus*, *B. inermis*, *Aira cæspitosa*, and *Apera spica venti*. Uredospores from *Poa compressa* infected *P. compressa* and *P. serotina* but not wheat, rye, oats, or barley. Uredospores from *Apera spica venti* and *Calamagrostis epigeios* were unable to infect any of the cereals or wild grasses inoculated. Uredospores from *Arrhenatherum elatius* infected oats but none of the other cereals. Uredospores from barley infected barley, wheat, and *Triticum repens*.

Experiments were also conducted with the æcidiospores from Berberis obtained by sporidia infection from various grasses with the following results: Æcidiospores from rye sporidia infected rye, *Triticum repens*, *Dactylis glomerata*, and *Bromus secalinus*; those from wheat sporidia infected wheat, barley, and *T. vulgare*; those from oat sporidia infected oats only; those from barley sporidia infected barley, wheat, *T. repens*, and *Lolium perenne*; those from *T. repens* sporidia infected rye, barley, wheat, *T. repens*, *D. glomerata*, and *L. perenne*; those from *D. glomerata* sporidia infected rye, *T. repens*, *D. glomerata*, and *B. secalinus*; those from *B. secalinus* sporidia infected rye, *T. repens*, *D. glomerata*, and *B. secalinus*; and those from *L. perenne* sporidia infected barley, wheat, *T. repens*, and *L. perenne*; while those from *Apera spica venti*, *Arrhenatherum elatius*, *Poa compressa*, and *Agrostis alba* sporidia infected only the original host grass in each instance.

Treatment of seed wheat for smut, H. F. Roberts and P. W. Graff (*Kansas Sta. Circ. 12, pp. 4*).—Directions are given for the seed treatment of wheat for the prevention of loose and stinking smut. For the stinking smut the best treatment is said to be with formaldehyde solution, while for the loose smut the modified Jensen hot-water treatment is recommended.

The fiber rot of ginseng and its control, H. H. Whetzel and G. Osner (*Spec. Crops, n. ser., 9 (1910), No. 97, pp. 411–416, figs. 4*).—The authors discuss the probable cause, characteristics, and methods of combating this disease, which is supposed to be due to *Thelavia basicola*, a fungus always found associated with it.

It was found that ginseng beds that had been limed were especially subject to this disease, while unlimed beds were more or less free from it, or at least not so severely attacked. In a similar disease of tobacco it was found (E. S. R., 20, p. 155) that the fungus, *T. basicola*, is very sensitive to acids and will not grow in acid soils. The use of acid fertilizers, therefore, proved very beneficial in the case of the tobacco root rot. For this reason, the use of acid phosphate as a means of controlling the disease on the ginseng is recommended. The results of experiments conducted in 1910 by various growers indicate that very beneficial results can be obtained by using from 1,000 to 2,000 lbs. per acre of acid phosphate on ginseng beds infected with fiber rot, and especially on beds where seed is sown.

Notes on a fungus found destroying potatoes, T. H. Johnston (*Agr. Gaz. N. S. Wales, 21 (1910), No. 8, pp. 699–701, pl. 1, fig. 1*).—A more extended description of the honey fungus (*Armillaria mellea*) (E. S. R., 24, p. 45) is given and of the appearance of potato tubers which are attacked by it.

The tubers are more or less enveloped by chocolate-colored, branching rhizomorphs of the fungus, which form white sheets of mycelia in the tissues of the potato. Ultimately the whole tuber is destroyed and shrivels into a dry mass similar to the dry rot produced by the fungus *Fusarium solani*.

Investigations on the leaf-roll disease of the potato, G. Bohutinsky-Križevci (*Ztschr. Landw. Versuchsw. Österr., 13 (1910), No. 7, pp. 607–633, figs. 3*).—As a result of further investigations (E. S. R., 23, p. 743) on the leaf-roll disease of the potato, the author claims that the disease is carried over from one year to the next on the potato skins, although plants, the tubers of which are sound, may undoubtedly be infected by means of wind-carried spores.

The infection originates in the growing points of roots and shoots, where the fungus attacks principally the tenderest tissues, usually the root hairs in the case of the roots. By the destruction of the root hairs the larger rootlets are weakened or even killed, while invading saprophytes continue the work of decomposition even into the stems. The injurious effect of the fungus attack manifests itself principally, especially under unfavorable conditions, in a checking of the growth of the plant.

Judging from the fruiting stages, the fungus seems to be a pyrenomycete with a Helminthosporium fructification. The infection of sound tubers can occur by means of the tubers of diseased plants. Much more active, however, in this respect are the shoots and roots of such tubers.

Treatment of the tubers of diseased plants with formalin proved worthless in controlling the disease.

[Experiments on the leaf-roll disease of the potato], O. Reitmair (*Ztschr. Landw. Versuchsw. Österr., 13 (1910), No. 4, pp. 190–197*).—In a report on the work done by the agricultural-chemical experiment station at Vienna for the year 1909, the results are given of field experiments on inheritance and the physical condition of the soil as factors in the development of the leaf-roll disease of the potato.

It is claimed that the disease can be produced by using tubers from diseased plants, and can be transmitted from generation to generation of potatoes without the intervention of fungi.

The intensity of the disease was found to be decidedly affected by external growth conditions in some cases, even entirely disappearing under favorable soil and weather environments, while mechanical conditions of the soil unfavorable to the vigorous growth of the potatoes clearly increased the intensity of the disease. If such conditions are continued for a few years, they will finally result in the complete destruction of the crop.

The leaf-roll disease of the potato, its cause and prevention, J. Vañha (*Monatsh. Landw., 3 (1910), No. 9, pp. 268–276, figs. 2*).—As a result of observations and inoculation experiments the author claims that the principal cause of the leaf-roll disease of the potato is, in the cases investigated, an ascomycetous fungus belonging to an undescribed genus and species, for which the name *Solanella rosea* n. g. and n. sp. is suggested and a technical description of which is given.

The fungus exists in the soil, on the surface of which its ascomata are borne, and is disseminated by means of the tubers. A similar disease is also produced by a nematode, which the author provisionally calls Tylenchus I.

Lohsol (from 20 to 40 cc. to every square meter of soil), a carbolineum preparation, was found very effective against the disease, either when mixed with the soil or when used for disinfecting the seed tubers.

On the control of the heart or dry rot of sugar beets, G. LABBÉ (*Bul. Assoc. Chim. Sucr. et Distill., 28 (1910), No. 1–2, pp. 119–131, fig. 1*).—The results are given of various experiments with different fertilizers, lime, soot, ashes, etc., on the control of the heart or dry rot of beets.

It is claimed that on the addition of nitrogenous fertilizers alone the disease increased, and that it is more intense during dry periods and is less active on plants with low sugar content. It is suggested that the addition of phosphoric acid, humus, and lime in various forms, would be of great value, both chemically and in putting the soil in a better physical condition.

Tables are given showing results obtained from the use of different substances, such as fertilizers, in controlling this disease.

Tomato diseases, H. W. BARRE (*South Carolina Sta. Bul. 153, pp. 31–36*).—A preliminary account is given of observations on a number of diseases of tomatoes, together with suggestions for their control, where definite means are known.

Among the diseases described are the shedding of blossoms and the cracking of fruit, due to environmental conditions; leaf blight (*Alternaria solani*), leaf spot (*Septoria lycopersici*), and leaf mold (*Cladosporium fulvum*), in which the fungi attack the foliage; point rot or blossom end rot, due to *Fusarium solani* and *Macrosporium fasiculata;* ripe rot (*Colletotrichum lycopersici*) of the fruit; and bacterial wilt (*Bacterium solanacearum*) and fungus wilt (*Fusarium* sp.), which attack the entire plant.

The prevalence of certain parasitic and saprophytic fungi in orchards, as determined by plate cultures, F. A. WOLF (*Plant World, 13 (1910), Nos. 7, pp. 164–172, fig. 1; 8, pp. 190–202, figs. 2*).—For these experiments trap cultures of glucose agar were placed on the ground during September to May, inclusive, at three different localities in an orchard at the Nebraska state farm. Trap cultures were also made from experiments in an old orchard and compared with those obtained in a new one. At one of the stations the ground cover was clover and alfalfa, and at another millet stubble, while the third was on absolutely clean, cultivated ground.

It was found that the greater number of forms present in orchards during this time were saprophytes, the most common being *Alternaria* sp., *Cladosporium* sp., and *Penicillium expansum*, while *Phyllosticta limitata*, a parasite producing leaf spot of apples, was present in abundance during the entire winter, regardless of temperature. *Nummularia discreta*, although the fruits were mature, did not disseminate its spores in May, while at no time (September to May, inclusive) were viable spores of *Sphæropsis malorum* present in the atmosphere of the orchard.

The total number of spores in the air of an orchard was influenced by the ground cover, being less in well-kept orchards and more in neglected ones.

Bitter pit of the apple, I. B. P. EVANS (*Transvaal Dept. Agr., Tech. Bul. 1, pp. 18, pls. 5*).—An extended account is given of the prevalence of the disease in South Africa, the varieties of apples affected, its characteristics, causes, and probable remedies.

All imported varieties were found more or less subject to this disease, while two native seedlings (known locally as Koo and Wemmers Hoek) were practically immune.

A microscopical examination of the spots failed to show the presence of any causal fungi or bacteria, but did show that the brown spots arise in close connection with the vascular bundles, especially at the ends of the bundles where the cells, being subject to great internal pressure, become enlarged and thick-walled. This pressure is caused by an accumulation of water which inflates the cells until many of them can not resist the strain, and consequently burst. Atmospheric oxygen, together with the enzyms present, acts on the tannin, producing dark-colored oxy-compounds, while further diastatic action is inhibited thereby leaving unaltered many primary starch grains in the vicinity of the necrotic tissues.

It is claimed that excessive transpiration during the day, followed by its sudden checking and complete abeyance during the night, when root action is still vigorous owing to the warmth of the soil, are the main factors in producing this disease.

The only remedy suggested is the growing of South African varieties from seed sown there, and thus building up an orchard adapted to its environment.

On the outbreaks of apple mildew, G. Lüstner (*Ber. K. Lehranst. Wein, Obst u. Gartenbau Geisenheim, 1909, pp. 120–123*).—A brief discussion is given of the various outbreaks of mildew (*Podosphæra leucotricha*) in recent years, and its prevalence and severity in 1909 on both apples and pears.

The destruction of the diseased branches on which the perithecia are found is recommended, and the use of sulphur and lime-sulphur spray is also suggested.

Observations on the dying of Rhenish pear trees, G. Lüstner (*Ber. K. Lehranst. Wein, Obst u. Gartenbau Geisenheim, 1909, pp. 123–125*).—In experiments on the control of this disease it was found that wrapping the trunks of pear trees with straw was of value in preventing it, while whitewashing the trunks proved worthless.

The author claims that the dying of the trees is probably due to sun scalds and excessive drying of the tissues of the bark, while invading fungi, such as *Valsa leucostoma*, play only a subordinate rôle. The propagation and planting of resistant varieties is recommended as the best means of prevention.

Contribution to the study of Bordeaux injury on peaches, B. H. A. Groth (*New Jersey Stas. Bul. 232, pp. 3–19, pls. 2*).—The results are reported of a series of experiments for determining the conditions necessary to produce Bordeaux mixture injury, in which the following questions were investigated: The dependence of the injury on the absolute amount sprayed on the leaves; the comparison of a limewater spray without the copper sulphate and the usual Bordeaux mixture spray as to injuries produced; the effect of Bordeaux mixture on the detached branches; comparison of the injuries to apples, peaches, and plums; the possibility of Bordeaux mixture injury in a greenhouse sheltered from rain; differences in the injury caused by Bordeaux mixture of different strengths; relationship of improperly mixed Bordeaux mixture to leaf burn; tests for injury on peach trees protected from rain; the solubility by rain water of the copper in Bordeaux mixture; atmospheric humidity alone as the determining factor; the presence of water on the sprayed leaf as a condition favorable to Bordeaux mixture injury; and a comparison of the sensitiveness to Bordeaux mixture of the upper and lower surfaces of peach leaves.

The following general conclusions were drawn as a result of these experiments: (1) Bordeaux mixture injury on peach leaves may occur after a very light spray, an ordinary spray, or a very heavy spray; (2) the copper in the Bordeaux mixture is the injurious factor; (3) peaches are more sensitive to Bordeaux mixture injury than apples; (4) Bordeaux mixture injury to peaches may occur in the laboratory under certain conditions combined, viz, a covering of water on the leaves, a high atmospheric humidity, an excess of respiration over carbon dioxid assimilation, and shade; (5) a peach leaf is attacked principally from the lower surface through the stomata; (6) the injury is probably caused by the excess of carbon dioxid evolved in the shade passing into the water standing on the surface of the leaf during wet weather, the carbonated water thus formed dissolving some of the copper, which then diffuses through the water film into the stomatic chamber where it kills the cells with which it comes in contact.

On the outbreak of red leaf spot in the vineyards of Grünberg in Silesia, G. Lüstner (*Ber. K. Lehranst. Wein, Obst u. Gartenbau Geisenheim, 1909, pp. 126–129, fig. 1*).—It is stated that the disease has been present in this region for over 100 years, being worse during some seasons than others.

It appears as reddish spots or streaks at the junction of the main and side veins or of two side veins, and often spreads over a great part of the leaf surface. Later the affected tissues turn a clear dark brown color, and finally the diseased leaves fall off.

The disease is caused by a fungus (*Pseudopeziza tracheiphila*), which lives in the vessels of the leaf veins. It is usually associated with sandy or gravelly soils where the rain water sinks too rapidly, so that the vines in dry weather suffer for lack of moisture.

The addition of vegetable matter, manure, etc., to such soils is suggested as a probable remedy.

Stereum hirsutum as a destroyer of grapevine stakes, G. Lüstner (*Ber. K. Lehranst. Wein, Obst u. Gartenbau Geisenheim, 1909, pp. 133, 134, fig. 1*).—In addition to the two known stake destroying fungi (*Polyporus vaporarius* and *Xylaria hypoxylon*), the author claims that *S. hirsutum* also rots the grapevine stakes (usually oak), making them brittle and easily broken off at the ground.

On the structure and life history of Diplodia natalensis n. sp., I. B. P. Evans (*Transvaal Dept. Agr., Sci. Bul. 4, pp. 18, pls. 8; abs. as Transvaal Dept. Agr., Farmers' Bul. 109, pp. 4, fig. 1*).—This is a further report (E. S. R., 23, p. 550) on the black rot of Natal citrus fruit, including a discussion of its general and specific characteristics, means of dissemination, methods of combating it, and the systematic position of the causal organism, *D. natalensis.*

It is claimed that the fungus is able to attack citrus fruit in all stages of development, provided the fruit is plucked or the rind slightly injured, but that the infection usually occurs at the stem end of the fruit and may remain 10 to 15 days before any signs of the disease appear. It also attacks apples, apricots, and peaches through abrasions in the skin.

The disease is carried over from season to season by means of the fungi present on mummified fruits lying about the orchard.

Cleaning up the orchard and burning all fallen fruit is recommended as a remedy for controlling the disease.

The diseases of the orange, G. Gandara (*Estac. Agr. Cent. [Mexico] Bol. 31, pp. 1–17, 43–51, pls. 16*).—In a discussion of plant and animal parasites of the orange in Yucatan, the author figures and describes the characteristics of each and gives methods of combating them.

In the first part devoted to plant parasites of the orange, the following are noted: Gummosis (*Bacterium gummis*); anthracnose (*Colletotrichum glœosporioides*); fruit spot (*Glœosporium psidii*); verrucosis (*Cladosporium* sp.); canker (*Dematophora necatrix*); white crust caused by a Corticium which grows on the extremities of the branches, completely killing them, for which cutting and burning the infected limbs is the only remedy suggested; three polypori (*Polyporus hispidus, P. annosus,* and *P. igniarius*); a fungus parasitic on the large roots and trunks of the orange trees, belonging apparently to the family, Tremelinaceæ; dodder (*Cuscuta americana*); "moss" (*Tillandsia recurvata*); and mistletoe (*Loranthus calyculatus*).

In the second part the diseases due to animal parasites are discussed (see p. 163). In the third part, the diseases due to physiological causes are described, viz, chlorosis, and a splitting of the fruit. The fourth part discusses diseases due to unknown causes, such as melanose, die back, and blight, while the bulletin closes with brief directions for the preparation and application of Bordeaux mixtures.

On the diseases of cacao, A. E. BARTHE (*Rev. Agr.* [*Santo Domingo*], *6* (*1910*), *No. 5, pp. 103–112*).—In a discussion of several common diseases of cacao in tropical America, the author calls special attention to a brown rot of the pods, or cacao canker, due, it is claimed, to a new species of Phytophthora named by C. Maublanc *P. faberi*, a technical description of which is given. This disease is said to destroy at times three-fourths of the cacao crop, and is favored by dampness and shade.

Spraying during the rainy season with a Bordeaux mixture, to which 250 gm. of colophony (a kind of resin) and 500 gm. of starch has been added, and with a solution of copper sulphate in dry weather, is advised. In starting new cacao plantations, greater distances between the plants, and the use of *Hevea brasiliensis* or *Castilloa elastica* as shade trees, are also recommended.

A disease of tea seedlings, C. BERNARD (*Bul. Dept. Agr. Indes Néerland.*, *1910, No. 40, pp. 39–48, pl. 1*).—A description is given of a disease of tea seedlings in which the cortical layers of the radicle, as it pushes its way into the ground, are destroyed. The pith is filled with the vegetative mycelium of a fungus which seems to corrode and absorb the starch grains, thus preventing the growth of the roots and finally killing the young seedlings.

The primary cause of the disease seems to be a too prolonged soaking of the seed before planting, and, perhaps, an excessive humidity in the nurseries at the time of germination, thus permitting destructive fungi to develop.

Another type of the disease is seen in the nurseries when the stems are attacked just at the surface of the ground, causing the cortex to become depressed, dry, and brown, while the interior cells present symptoms similar to those seen in the pith of the diseased roots. The leaves of the young seedling wilt and finally the entire plant dies. This type of the disease seems to be favored by high temperatures and by an excessive humidity of the soil.

No spores or conidia were found by which to identify the fungus, but its mycelium resembles that of *Rosellinia necatrix*. As the disease is apparently introduced into the soil with the seed, disinfection of the seed, followed by the shading of the seedlings and good drainage of the nurseries, are recommended as remedies.

[Pests of Para rubber trees], H. N. RIDLEY and R. DERRY (*Agr. Bul. Straits and Fed. Malay States, 9* (*1910*), *No. 8, pp. 289–297*).—The authors state that the fungus *Fomes semitostus* seems to be spreading more slowly among the trees at the place where it first appeared, while the destruction of stumps and roots is proving the most successful preventive measure.

A disease of the Para rubber tree (E. S. R., 22, p. 548) is described, which attacks the trees above the branches, causing the leaves to wither, while the cambium is a pale, dull red and the bark has no latex in it. The trees die in a few days when once attacked. From a dead stem killed by this disease, spores of *Diplodia rapax* developed and were used for inoculation experiments on healthy Para rubber plants. It was found that the growth of the fungus was very rapid, as the spores germinated in 12 hours after inoculation, and the leaf stalk thus diseased died in 6 days, while in about 4 days more fresh spores were produced. No preliminary infection by Glœosporium was found necessary. The fungus apparently can not attack healthy, uninjured buds, but can attack young, imperfectly developed leaves.

Further observations on *Eutypa caulivora* (E. S. R., 23, p. 750) indicate that it is not a parasite, as was supposed, but only a saprophytic fungus. Injuries to overcrowded nursery seedlings by mites are noted, and dusting with flowers of sulphur is recommended as a remedy.

A new leaf disease of Hevea from Surinam, MEVR. A. E. VAN HALL-DE JONGE (*Dept. Landb. Suriname Bul. 24, pp. 6, pls. 2*).—A description is given of a new leaf spot of Para rubber which appeared in 1908 in the nursery at the Botanic Gardens.

The fungus attacks only young leaves, forming spots which spread in concentric circles on the underside of the leaves. The disease is very infectious, and has spread rapidly in the nursery because of the overcrowded condition of the seedlings, although trees in favorable circumstances are probably little susceptible to it.

Fungus galls on the roots of Kickxia elastica, F. C. VON FABER (*Ann. Mycol., 8 (1910), No. 4, pp. 449–451, fig. 1*).—A description is given of the characteristics (structural, etc.) of certain galls found on the roots of Kickxia seedlings.

The diseased plants are easily recognized by their small, yellowish, drooping leaves, this being due to a poorly developed root system in which the smaller rootlets are often devoid of root hairs, and terminate in gall-like thickenings. a microscopical examination showed numerous hyphæ of some unknown fungus present in the diseased tissue, and these were supposed to be the cause of the hypertrophied condition.

The sudden death of old twigs on the horse chestnut, R. LAUBERT (*Aus der Natur, 5 (1909), No. 16, pp. 499–501*).—Attention is called to the sudden wilting and final death of old twigs of the horse chestnut, due, it is claimed, to attacks of the fungus (*Nectria cinnabarina*) which enters through wounds produced by stoning the trees, and by live stock, wind, etc.

The formation of galls on Juniperus communis, G. SEVERINI (*Ann. Bot. [Rome], 8 (1910), No. 2, pp. 253–262, pl. 1*).—In a study of the structure and causes of the galls formed on the twigs and branches of *J. communis*, it was found that the excrescences were always associated with pre-existing lesions in the tissues, especially with those corresponding to the leaf traces, and were produced principally by the activity of the phellogen, and, secondarily, by the cambium.

The mycelium of a Ceratostoma (probably *C. juniperinum*) was constantly present in the affected tissues, even in the very young stages, and had its seat exclusively in the periderm tissues, especially in the phelloderm, where its vegetative stages were developed after a special manner.

The disease was reproduced by inoculating healthy twigs with the vegetative mycelium of the fungus. The presence of colonies of Schizomycetes in the affected tissues was not observed.

The leaf blight of the American mistletoe (Phoradendron flavescens), F. A. WOLF (*Mycologia, 2 (1910), No. 5, pp. 241–244, pl. 1*).—A description is given of a disease of the mistletoe in Texas, which manifests itself by chlorosis of a part or the whole of the leaf. The affected foliage becomes dark, dies, and finally falls off.

It is caused by a fungus (*Macrophoma phoradendri* n. sp.), a technical description of which is given.

Observations on the new twig and bud disease of lilacs, G. LÜSTNER (*Ber. K. Lehranst. Wein, Obst u. Gartenbau Geisenheim, 1909, pp. 131–133*).—The occurrence of this new lilac disease (*Phytophthora syringæ*), previously noted from Hamburg and vicinity (E. S. R., 22, p. 749), is reported on lilacs from a Rhenish province and on plants in several gardens in Frankfurt.

Chrysanthemum Alice M. Love and the rust fungus (*Gard. Chron., 3. ser., 48 (1910), No. 1239, p. 234*).—Attention is called to the complete immunity of this variety from the common chrysanthemum rust, and for this reason a careful study of its chemical properties is advised.

Eelworms, T. W. KIRK and A. H. COCKAYNE (*New Zeal. Dept. Agr., Div. Biol. Bul. 20, pp. 7, pls. 4, figs. 2*).—Several species of nematodes have become troublesome in New Zealand, namely, the stem-eelworm (*Tylenchus devastatrix*), cucumber or tomato eelworm (*Heterodera radicicola*), beet-eelworm (*H. schachtii*), and the ear-cockle (*T. tritici*).

ECONOMIC ZOOLOGY—ENTOMOLOGY.

The history of the fauna of Ceylon, F. SARASIN (*Zool. Jahrb., 1910, Sup. 12, No. 1, pp. 160, maps 6; abs. in Nature [London], 83 (1910), No. 2117, p. 363*).—In the attempt to explain the origin and relationships of the fauna of the Island of Ceylon, this work embraces a survey of the relationships and probable migrations of the faunas of southeastern Asia generally and their connection with that of Africa. Details are given with regard to the geographical range of the various genera of mammals, reptiles, mollusks, planarians, and worms constituting the Ceylon fauna. Ceylon, which long formed a portion of "Gondwanaland," and is thus of great antiquity, appears to have been isolated from the Indian mainland during the whole or the greater portion of the Pleistocene period.

A bibliography of 174 titles relating to the subject is appended.

Mammalian anatomy with special reference to the cat, A. DAVISON (*Philadelphia, 1910, 2. ed., rev., pp. XIII+246, figs. 114*).—A second revised edition of this work.

Practical anatomy of the rabbit, B. A. BENSLEY (*Toronto and Philadelphia, 1910, pp. VI+203, figs. 72*).—An elementary laboratory text-book on mammalian anatomy.

Injury by rabbits in Germany, M. E. HENRY (*Ann. Sci. Agron., 3. ser., 5 (1910), I, No. 3, pp. 181–196*).—An account of the injury caused by *Lepus cuniculus* in Germany and of preventive and remedial measures. Its enemies, including parasites, are briefly considered.

A contribution to our knowledge of the mole (Talpa europœa), L. E. ADAMS (*Mem. and Proc. Manchester Lit. and Phil. Soc., 47 (1903), pt. 2, No. 4, pp. 39, figs. 28*).—This study of the mole was conducted in the vicinity of Stafford, England.

Some notes on the breeding habits of the common mole, L. E. ADAMS (*Mem. and Proc. Manchester Lit. and Phil. Soc., 54 (1909), pt. 1, No. 2, pp. 9, pl. 1, figs. 3*).—In this second paper the author reports observations of breeding nests, time of breeding, rate of growth of young, etc. He is of the opinion that the mole lives at least 4 or 5 years.

Revision of the wood rats of the genus Neotoma, E. A. GOLDMAN (*U. S. Dept. Agr., Bur. Biol. Survey, North American Fauna No. 31, pp. 124, pls. 8, figs. 14*).—Wood rats are said to be restricted to North America, where they are widely distributed, especially in the United States, in the southern part of which they range from the Atlantic to the Pacific coasts. They are especially numerous in the arid West. In California it has been found that they may serve as carriers of the plague.

"Wood rats are chiefly nocturnal in habits, but some are partly diurnal. Their food is largely determined by varying local conditions, but consists mainly of a great variety of green vegetation, including grass, leaves, fresh fruit, small bulbs, bark, and cactus stems. Dry seeds, nuts, and fungi are also eaten. . . . Some of the desert species are sufficiently numerous to inflict appreciable damage on growing crops in fields and gardens and to carry off considerable grain stored on farms, but they have not thus far proven as injurious as some other rodents. In the arid regions of the Southwest they girdle and kill many native shrubs and severely injure cactuses, especially during the long dry season when other food is scarce. . . . On the table-land of Mexico wood rats of the *albigula* group are regularly hunted for their flesh."

The genus Neotoma is here divided into three subgenera: Neotoma, Homodontomys, and Teonoma, under which 70 species and subspecies are recognized. The subgenus Homodontomys is characterized for the first time. A key to the species and subspecies and maps showing the distribution of the various forms accompany the account.

Eradicating plague from San Francisco, F. M. Todd (*San Francisco, 1909, pp. 313, pl. 1, figs. 26*).—Accounts of the methods followed in destroying rats are included in this report.

Examination of contents of stomachs and crops of some Australian birds, J. B. Cleland (*Emu, 9 (1910), No. 4, pp. 219–226*).—Results of an examination of the stomach contents of 57 birds of many species are reported.

Notes on the food of a king eider, G. C. Embody (*Science, n. ser., 31 (1910), No. 799, pp. 630, 631*).—The contents of the crop, stomach, and gizzard of a wild duck (*Somateria spectabilis*), captured on the Seneca River, New York, on November 26, 1909, are reported upon.

How to study birds, H. K. Job (*New York, 1910, pp. IX+272, pls. 32*).—A practical guide for amateur bird lovers and camera hunters.

The International Ornithological Congress (*Field [London], 115 (1910), Nos. 2997, p. 965; 2998, p. 1000*).—A brief report of the proceedings of the Fifth International Ornithological Congress, which opened at Berlin on May 29, 1910.

Termite cultivators of fungi and the fungi which they cultivate in Madagascar, H. Jumelle and H. Perrier (*Rev. Gén. Bot., 22 (1910), No. 253, pp. 30–64, figs. 9*).—A somewhat extended discussion.

On Hæmatozoa occurring in wild animals in Africa, G. H. F. Nuttall (*Parasitology, 3 (1910), No. 1, pp. 108–116, pls. 2*).—*Piroplasma rossi* and *Hæmogregarina canis adusti*, found in the jackal, and *Spirochæta bovis caffris*, found in the buffalo, are described as new to science.

Index-catalogue of medical and veterinary zoology, C. W. Stiles and A. Hassall (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 39, pt. 32, pp. IV+2443–2508*).—This part lists the literature by authors from V to Vyner.

Bibliography of Canadian zoology for 1908, L. M. Lambe (*Proc. and Trans. Roy. Soc. Canada, 3. ser., 3 (1909), Sect. IV, pp. 169–176*).—Fifty-four titles are listed, exclusive of entomology.

Bibliography of Canadian entomology for the year 1908, C. J. S. Bethune (*Proc. and Trans. Roy. Soc. Canada, 3. ser., 3 (1909), Sect. IV, pp. 135–146*).—Ninety-six titles are listed.

[Report of scientific work in the field of entomology during 1905], G. Seidlitz et al. (*Arch. Naturgesch., 72 (1906), II, No. 2, pts. 1, pp. 1–308; 2, pp. 309–652; 3, pp. VI+653–894*).—This work is devoted to bibliographies and a classification of the literature. The first fascicle relates to general entomology and Coleoptera, the second to Hymenoptera, Rhynchota, and Lepidoptera, and the third to Diptera, Siphonaptera, Mallophaga, Thysanoptera, Corrodentia, Orthoptera, etc., also Myriopoda, Arachnida, Prototracheata, and Crustacea.

[Report of scientific work in the field of entomology during 1906], G. Seidlitz et al. (*Arch. Naturgesch., 73 (1907), II, No. 2, pts. 1, pp. 448; 2, pp. 280*).—Bibliographies are presented and the literature classified. The first fascicle takes up general entomology and Coleoptera, the second Hymenoptera, Rhynchota, and Lepidoptera.

[Report of scientific work in the field of entomology during 1907], G. Seidlitz (*Arch. Naturgesch., 74 (1908), II, No. 2, pt. 1, pp. 392*).—In this first fascicle, the literature on general entomology and Coleoptera is listed and classified.

Insects and entomologists: Their relations to the community at large, J. B. Smith (*Pop. Sci. Mo., 76 (1910), No. 3, pp. 209–226, figs. 17; 77 (1910), No. 5, pp. 467–477, figs. 26*).—A popular lecture delivered before the Entomological Society of America at Boston December 30, 1909. In the second part the earlier American entomologists are briefly considered, photographs of 26 being reproduced.

Destructive insects and their control, O. E. Bremner (*Sacramento: Cal. State Com. Hort., 1910, pp. 39, figs. 28*).—A popular account of the more important insect pests which occur in California, with methods of control.

Report of injurious insects, P. J. Parrott (*West. N. Y. Hort. Soc. Proc., 55 (1910), pp. 114–119, figs. 6*).—During 1909, it was determined that gnarly pears—fruit stunted, irregular in shape, pitted, and more or less marked with hard, corky spots—are the result of attacks by the false tarnished bug (*Lygus invitus*). Seventy-five per cent of the fruit in one orchard examined was damaged by this insect and 50 per cent of the crop rendered practically valueless. *Heterocordylus malinus*, previously noted by Slingerland as a source of injury in 1908 (E. S. R., 22, p. 654) attracted considerable attention in the Onondaga Valley and about Waterloo and Geneva. The cherry ermine moth (*Hyponomeuta padella*) was discovered in a plantation of foreign cherry seedlings (E. S. R., 23, p. 657).

Report of the entomologist, W. V. Tower (*Porto Rico Sta. Rpt. 1909, pp. 24–28*).—In reporting upon the control of orange pests, mention is made of the injury by and methods used in combating the purple scale and rust mite.

The larva of one of the Lachnosterna beetles is causing a great deal of damage to the roots of sugar cane. In pot experiments and fieldwork with the pest, lime has given the best results of any of the repellents used, while kainit gave equally good results as a killing agent for the grub in the soil.

Satisfactory results are reported to have been obtained from the use of hydrocyanic-acid gas in fumigating for a beetle that is a source of injury to stored tobacco. It is stated that as yet no bee diseases have been found on the island and attention is called to the importance of special precaution in purchasing bees from countries where such diseases occur.

Studies were made of a small beetle (*Xyleborus* sp.) which destroys the guava and guama, 2 leguminous trees that are used as shade for coffee, and of the coffee leaf-weevil (*Lachnopus* sp.). The eggs of the last-mentioned species are laid in clusters upon coffee leaves and the larvæ upon hatching out pass to the ground.

Fifth annual report of the state entomologist and plant pathologist for 1909, G. M. Bentley (*Ann. Rpt. State Ent. and Plant Path. [Tenn.], 5 (1909), pp. 40, figs. 5*).—This report, which is largely devoted to an account of the nursery inspection work, includes frost charts by J. F. Voorhees, which show the latest killing frosts in the spring and the earliest killing frost in the fall, formulas and directions for the application of several lime-sulphur solutions, etc. The laws and amended rules and regulations relating to nursery inspection and the rules and regulations of the state board of entomology are appended.

Insect notes (*Agr. News [Barbados], 9 (1910), No. 208, p. 122*).—The occurrence of the flower bud maggot of cotton (E. S. R., 22, p. 360) in Antigua during the cotton season of 1909–10 is briefly noted by H. A. Tempany. Earlier planting appears to have been of the greatest value in preventing the attacks of the maggot.

A peculiar case of parasitism of a flying fish by a species of Chrysomyia is also noted.

Insect carriers of disease (*Va. Health Bul., 1 (1909), No. 13, pp. 347–359, figs. 7*).—This bulletin calls attention to the rôle of flies and mosquitoes in the dissemination of disease and describes the several methods of exterminating them.

Preventive measures against infectious diseases, with special reference to those transmitted by insects, A. J. SMITH (*Univ. Penn. Med. Bul., 23 (1910), No. 3, pp. 119–132*).—"In all these cases of insect transmission our mode of operation in prophylaxis must include one or all of these features: (a) Destruction of the original focus from which insects may become infected; (b) in event of an inability to thus destroy the primary focus for one or other reason, to prevent access of insects to such material; (c) to destroy the insects themselves, or, (d) to prevent access of the insects to the unprotected individual; or, finally, in any cases where these are uncertain, as is usual, to institute procedures to immunize the individual against the infection."

The insect pests of cotton [in Egypt], F. C. WILLCOCKS (*Cairo Sci. Jour., 4 (1910), No. 42, pp. 57–64*).—The 6 insects here briefly considered, namely, the Egyptian boll worm (*Earias insulana*), Egyptian cotton-worm (*Prodenia littoralis*), cotton aphis, black cutworm, African cotton stainer, or cotton bug (*Oxycarenus hyalinipennis*) and small green cotton-worm (*Caradrina exigua*), are the chief enemies of the cotton crop in Egypt.

Some new enemies of fruit, G. LÜSTNER (*Jahresber. Ver. Angew. Bot., 7 (1909), pp. 93–116, figs. 6*).—Three species are noted in this account, namely, *Diaspis piri*, the strawberry mite (*Tarsonemus fragariæ*) and the currant mite (*Eriophyes ribis*).

Investigating some serious deciduous tree pests, J. A. PRIZER (*Cal. Cult., 34 (1910), No. 20, p. 603*).—A brief account is given of injury caused by termites to the roots of peaches, pears, apricots, and prunes at Banning, Cal. The roots in some of the trees were entirely destroyed. In some instances the insect had worked well up into the new wood and even into the branches.

The peach worm, discovered at the same place, is recorded from southern California for the first time.

A list of injurious insects of the mulberry tree in Japan, S. NIWA (*Bul. Assoc. Séri. Japon, 1910, No. 218, pp. 1–3*).—Seventy species are here listed.

Animal parasites of the orange, G. GANDARA (*Estac. Agr. Cent. [Mexico] Bol. 31, pp. 18–42, pls. 36*).—An account of the insects affecting the orange in Mexico, their natural enemies, and remedial measures.

The animal enemies of the rose, M. SCHWARTZ (*Gartenflora, 59 (1910), No. 7, pp. 137–148*).—The insect enemies of the rose and remedial measures are considered under the headings of injury to the bud, bloom, and fruit, injury and deformity of the leaves, injury to the twigs and shoots, and injury from attack on the roots.

The ked, or sheep louse, A. G. DAVISON (*Agr. Jour. Cape Good Hope, 36 (1910), No. 4, pp. 398–403, figs. 5*).—A preliminary report of experiments conducted to demonstrate that the sheep louse (*Melophagus ovinus*) does not destroy the scab mite as supposed by farmers in some parts of Cape Colony.

Froghoppers in sugar cane, F. W. URICH (*Bul. Dept. Agr. Trinidad, 9 (1910), No. 64, pp. 15–21*).—A report of the field work with *Tomaspis postica* during the season of 1909. Seasonal history records of froghoppers on cane estates are presented in tabular form and a bibliography of cane blight and froghoppers is appended.

The black scale and its parasite (*Agr. News [Barbados], 9 (1910), No. 211, p. 170*).—*Zalophothrix mirum*, which is widely distributed throughout the

West Indies, appears to have prevented the black, or Hibiscus scale (*Lecanium nigrum*) from becoming a pest in those islands.

Tukra disease in mulberry, H. M. Lefroy (*Dept. Agr. Bengal, Quart. Jour., 3 (1910), No. 3, pp. 173, 174, pl. 1*).—Tukra disease, which commonly attacks the bush mulberry, grown in Bengal for rearing silkworms, has been found to be due primarily to the puncture of a mealy bug (*Dactylopius nipæ*). As a remedy, it is recommended that the curled-up leaves be picked and destroyed. Insecticides are of no avail as they do not penetrate the curled-up leaves.

The anatomy of Siphonophora rosarum, the green-fly pest of the rose tree, A. J. Grove (*Parasitology, 3 (1910), No. 1, pp. 1–16, pls. 2, figs. 2*).—In this second paper (E. S. R., 21, p. 757) the winged viviparous stage is compared with the apterous viviparous stage.

A preliminary investigation on flock as a possible distributor of vermin, and on the life history of the body-louse (Pediculus vestimenti), C. Warburton (*Rpts. Local Govt. Bd. [Gt. Brit.], Pub. Health and Med. Matters, n. ser., 1909, No. 2, pp. 5*).—The author finds the life cycle of *P. vestimenti* to be as follows: Incubation period, 8 days to 5 weeks; period from larva to adult, 11 days; period of nonfunctional mature condition, 4 days; and adult life of male 3 weeks, of female 4 weeks.

"On one occasion a louse was found alive after 5 days of starvation, but it was moribund and unable to feed. A few survived 4 days' fasting in a fairly active condition, but this seems to be about the limit period for danger."

The author concludes that lice and their eggs may pass through the flock-making machine without being crushed. "The lice themselves are incapable of surviving more than 3 or 4 days without food, and it is extremely unlikely that any of them would be alive when the flock was converted into bedding. The eggs, however, may take a month or more to hatch, and it is quite possible that living eggs might be present in bedding."

The large moth borer of sugar cane, F. A. Stockdale (*Jour. Bd. Agr. Brit. Guiana, 3 (1910), No. 3, pp. 150–155*).—This account of *Castnia licus* includes a report of its occurrence and injury to sugar cane on the East Coast of British Guiana as investigated in 1909. The injury is caused by the larva, which bores in the cane eating the internal tissue as it works its way upward.

Artificial production of multivoltine races of silkworms, J. F. Abbott (*Science, n. ser., 31 (1910), No. 798, pp. 586–588*).—A review of some recent work on the subject.

Mosquito habits and mosquito control, F. Knab (*Science, n. ser., 31 (1910), No. 805, p. 869*).—A brief critical discussion.

Attention is called to the fact that normally the eggs of the yellow-fever mosquito are deposited out of water, at the edge of the water film and that here the eggs remain until they are submerged, whereupon hatching takes place. "Eggs remaining out of water retain their vitality a long time. In laboratory experiments eggs have been kept dry as long as five months, and, when then submerged, produced larvæ; under favorable conditions out-of-doors it is to be supposed that they will survive even longer."

On the larval and pupal stages of West African Culicidæ, W. Wesché (*Bul. Ent. Research, 1 (1910), No. 1, pp. 7–50, pls. 7*).—Twenty-nine species are considered in this account.

Galls on an Indian grass, L. A. Boodle (*Roy. Bot. Gard. Kew, Bul. Misc. Inform., 1910, No. 3, pp. 69–73, pl. 1*).—*Oligotrophus ischæmi*, which causes a gall on Indian grass (*Ischæmum pilosum*), is described as new.

Vaccine and flies, A. Merk (*Hyg. Rundschau, 20 (1910), No. 5, pp. 233–235*).—Following a review of previous investigations relating to transmission of the vaccine virus by flies, the details of investigations personally conducted are briefly reported. It is concluded that *Musca domestica* does not as a rule transfer this virus by way of the alimentary canal or otherwise.

Some observations on the eggs of the horse bot fly (Gastrophilus equi), W. E. Collinge (*Jour. Econ. Biol., 5 (1910), No. 1, pp. 9–17, figs. 3*).—From the observations here reported it is concluded that "the egg of *G. equi* is provided with a pair of lip-like valves, by means of which it is firmly attached to the hair. After the larva has escaped the egg-shell adheres for some considerable time to the hair. The eggs are not taken into the mouth as stated by Froggatt [E. S. R., 20, p. 460]. My experiments confirm and supplement those of Osborn, although the actual dates differ somewhat; thus the largest number of eggs hatched from the sixteenth to the twentieth day, and none hatched after the thirty-sixth day. Without moisture or friction very few eggs hatch."

The grape root-worm with especial reference to investigations in the Erie grape belt from 1907 to 1909, F. Johnson and A. G. Hammar (*U. S. Dept. Agr., Bur. Ent. Bul. 89, pp. 100, pls. 10, figs. 31*).—This bulletin presents a detailed report of studies of the grape root-worm (*Fidia viticida*) commenced at North East, Pa., in the spring of 1907 and extending over a period of 3 years, the last 2 in cooperation with the Pennsylvania state department of agriculture. A report of preliminary investigations has been previously noted (E. S. R., 19, p. 1158).

During the last 10 or 15 years this insect has attracted much attention on account of its ravages in vineyards along the southern and eastern shores of Lake Erie, comprising in general the grape growing territory of northern Ohio and the Erie and Chautauqua grape belts of Pennsylvania and New York, respectively. It was first described by Walsh in 1867, having been reported the previous year as occurring in Kentucky in destructive numbers. The first information relating to its early stages was furnished by Webster in 1894 (E. S. R., 8, p. 67). Up to the present time it has been recorded only from North America, where it occurs in the Mississippi Valley and in the Eastern States, and is undoubtedly a native species. It appears to have been observed feeding upon wild grapes long before it was found to infest cultivated varieties. In addition to wild grapes, it has been observed feeding upon red bud and Virginia creeper, but has found a more available food plant in the improved varieties of native grapes. It is said that attempts made during the investigations to locate the larvæ on roots of wild grapes failed, although in breeding work larvæ were reared to maturity thereon.

The injury wrought by this pest on the grapevine occurs both above and below the surface of the ground; however, by far the greater damage results from its work upon the roots. The appearance late in June or early in July of chainlike markings upon the upper surface of the foliage is the first intimation of the presence of the pest upon the vines. "Where the beetles are very numerous, however, and the foliage sparse, it not infrequently happens that the leaves are so badly scored that in a short time they take on a brown appearance and hang about in shreds. . . . It is, however, to the larvæ of this pest feeding upon the roots of the vines that the direct cause of the injury and death of so many vines is due. The work of the larvæ upon the roots may be recognized, when the vines are removed from the soil, by the absence of root fibers, by channels along the larger roots, and by pittings on the main trunk."

Brief descriptions are given of allied beetles and of those found upon grapevines, likely to be mistaken for this pest, together with technical descriptions of its different stages. A detailed account of life-history studies involving many experiments with numerous individuals is summarized as follows: "The grape root-worm produces only one generation a year; the larva feeds on the roots of the grapevine, and in this stage the insect is found in the ground for the greater part of the year. In early June the full-grown larva makes an earthen cell a few inches below the surface of the ground, within which it pupates about the middle of June; the pupal stage lasts generally 20 days, and the beetle or adult begins to emerge from the ground in late June or early July, while a few belated beetles continue to appear in the early part of August. On an average the beetle feeds for from 10 to 13 days on the grape foliage before ovipositing. The eggs are laid beneath the loose bark on the canes of the vines, and hatch on an average in 12 days; the young larva drops to the ground and soon finds its way to the roots of the vine; generally the larva becomes three-fourths grown and sometimes attains its full growth in the fall. Previous to wintering it penetrates deeper into the ground, below the roots, and there constructs an earthen cell in which it passes the winter." A diagram which shows the relative occurrence and time of transformation of the grape root-worm in its various stages accompanies the account.

Under the heading of natural enemies, mention is made of several predators, 2 hymenopterous egg parasites (*Fidiobia flavipes* and *Lathromeris* [*Brachysticha*] *fidiæ*), and an undetermined dipterous egg-parasite. Studies of the life history and habits of *F. flavipes* show that it requires 10 days for the egg and larval stages, 14 to 15 days for the pupal stage, or a total of 24 to 26 days for the whole life cycle. By breeding the parasites 2 full generations and a partial third were produced. The percentage of parasitized eggs in the field was found to vary considerably in different sections of the grape belt as well as in parts of the same vineyard. In 6 lots reported, the parasitism varied from none on sprayed vines to 35 per cent on unsprayed.

The vineyard conditions in the Lake Erie Valley are briefly described and detailed accounts given of work with remedial measures.

For the destruction of adult beetles, it is recommended that the first poison spray application be made as soon as the first beetles are found upon the vines, since observations indicate that the beetles feed much more freely immediately after emerging from the soil than they do several days later, during the period of egg deposition. "The beetles may be expected to appear on the foliage during the last week or 10 days in June or the first few days in July, depending on the earliness of the season. After June 20 vineyardists should keep a sharp watch for their appearance and have their spray equipment in readiness to make the first spray application. . . . Observations and experiments indicate that, if these 2 applications are made promptly and thoroughly, this pest can be reduced to such small numbers that it will not materially affect the vigor of the vines." The spray formula recommended consists of arsenate of lead 3 lbs., water 50 gal., copper sulphate 5 lbs., and fresh lump lime 5 lbs.

As soon as pupæ are discovered, the soil beneath the trellis should be removed by the horse hoe and the soil directly around the base of the vine carefully and thoroughly stirred with the hand hoe. The efficiency of this method of destroying the pupæ may be increased by throwing up a ridge of earth beneath the trellis during the last cultivation of the preceding summer, as this will tend to encourage the insects to form their pupal cells above the roots of the vine and thus admit of their destruction by cultivation without serious injury to the roots of the vine by the horse hoe. No effective measures have as yet been developed for the destruction of the larvæ or of the eggs. "Experiments conducted against the larvæ in the soil with oils, carbon bisulphid, fertilizers, salt, etc., have proved ineffective, and in some cases injurious to the grapevines; and since the eggs are deposited beneath the bark of the canes when the vines are in full foliage, it is practically impossible to reach them with a spray application." Suggestions are given concerning the care and treatment of newly planted vines, and also of old, run-down vineyards in relation to this insect problem.

A bibliography chronologically arranged is appended.

Notes on Cetonia aurata and C. floricola, A. H. Hamm (*Ent. Mo. Mag., 2. ser., 21 (1910), No. 246, pp. 137, 138, fig. 1*).—The author's observations appear to prove that the larvæ of *C. aurata* feed for several seasons before reaching maturity, that the imagos can hibernate and pass the winter in a quiescent state, and that all larvæ of the same age do not reach maturity together.

The economic importance of Scolytidæ in Irish forestry, A. C. Forbes (*Irish Nat., 19 (1910), No. 5, pp. 89–91, pl. 1*).—Brief mention is made of several species of bark beetles which may under certain exceptional circumstances prove troublesome to the forester or tree grower in Ireland.

An introduction to the study of Rocky Mountain bees, T. D. A. Cockerell and W. W. Robbins (*Univ. Colo. Studies, 7 (1910), No. 3, pp. 179–195, pls. 8*).—A summary of the classification adopted, in which most of the genera are distinguished, is first given. As an appendix there follows a brief abstract of Robertson's classification. An artificial key is included.

A radical cure for the swarming habit of bees, H. Jones (*Preston, Minn., 1910, pp. 25*).—The author recommends the uncapping of all but two frames of the sealed brood in each hive when the hives become filled to overflowing. The work should be repeated if at any time within 15 days the colonies are found making preparations to swarm.

Notes on a Colorado ant, H. O. Marsh (*U. S. Dept. Agr., Bur. Ent. Bul. 64, pt. 9, pp. 73–78*).—The notes here presented relate to *Formica cinereorufibarbis*, a species which occurs very commonly in the vicinity of Rocky Ford, Colo. It is said to be a source of injury due to its attending the melon aphis on cucurbits and a membracid on alfalfa.

In experiments in which solutions of potassium cyanid were used on nests ½ oz. per gallon of water was found to be nearly as effective as 2 oz. per gallon. Since the cyanid solution does not penetrate very deeply into the nests, the pupæ escape destruction unless they are very close to the surface. It is concluded that in order to keep the species within reasonable bounds, repeated applications of the cyanid are necessary.

The control of the Argentine ant, C. W. Woodworth (*California Sta. Bul. 207, pp. 53–82, figs. 28*).—Through the discovery of new localities and the natural spread of this ant more than twice as much territory in California as that reported in 1908 (E. S. R., 20, p. 352) is now known to be infested, or some 1,000 acres in southern California and 4,000 acres in the central portion of the State. Careful observations made of the spread of this ant for 2 years show that the average extension of the colony has not exceeded one-eighth of a mile a year and indicate that its spread depends primarily upon the ant being carried by man. Manure and nursery stock are particularly liable to be means of transportation, though the pest may be carried with all sorts of merchandise. Observations of winged individuals, produced in great quantities both in the laboratory and in the field, indicate that there is no flight whatever, so that it appears that there is practically no danger of spreading by the flight of queen ants.

Further study has shown that the danger due to the direct attack of this insect upon vegetation is not as large in California as that reported from Louisiana. At the same time, the author states that it is probably very conservative to estimate that the presence of the ant reduces the commercial value of real estate for residence purposes from 10 to 25 per cent.

The distinctive characteristics of the ant are pointed out and some 46 other species known to occur in the State are briefly discussed and treatment suggested. Control measures are considered under the headings of barring ants out, water barriers, ant-proofing, methods of killing, destruction of nests, ant powders, ant fluids, and arsenical poisoning. The best barrier consists of water treated with cresol and makes possible a practical ant-proofing of rooms or houses. For many ants the nests may be destroyed by the use of carbon bisulphid, potassium cyanid, or oil. A sirup containing a very small quantity of arsenic is recommended as the most available poison and the only really satisfactory method of killing the Argentine ant. The author considers eradication to be a possibility and thinks it should be undertaken.

Tick and other blood-sucking arthropoda of Jamaica, R. NEWSTEAD (*Bul. Dept. Agr. Jamaica, n. ser., 1 (1910), No. 3, pp. 145–175, pls. 9*).—A reprint of the account previously noted (E. S. R., 22, p. 558).

Acarinosis of the vine and its treatment, H. FAES (*Bul. Soc. Vaud. Sci. Nat., 5. ser., 46 (1910), No. 168, pp. 59–78, pls. 4, figs. 3*).—Since 1900, when injury to grapevines in Switzerland by acarids was noticed at Tartegnin, near Rolle on Lake Geneva, and along the border of Lake Bienne, these pests have rapidly increased and have become a source of injury in the cantons of Geneva, Vaud, Valais, Neuchâtel, Berne, Schaffhouse, etc. The mite concerned has been described by A. Nalepa as a new species, to which the name *Phyllocoptes vitis* is given. Mention is also made of an affection of the vine manifested in July and August by a brownish color which the leaves take on. This trouble is due to the acarid previously described by A. Nalepa as *Epitrimerus vitis.*

As remedial measures, the best results have been obtained from applications of a 4 per cent solution of cresol or a 3 per cent solution of alkaline polysulphids. Vines treated with the latter are said to present a somewhat more vigorous appearance than when cresol is used.

The use of arsenate of lead in viticulture, L. MOREAU and E. VINET (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 12, pp. 787–790*).—Lead arsenate did not appear in wine made from grapes from vines that had been sprayed with this insecticide. It is said to be eliminated with the refuse and probably also in the marc.

FOODS—HUMAN NUTRITION.

The nutritive value of beef extract, W. H. THOMPSON (*Pharm. Jour. [London], 4. ser., 31 (1910), No. 2455, p. 548*).—The author briefly summarizes the results of experiments with dogs, from which he concludes that beef extract has both a direct and an indirect nutritive value. The investigation was undertaken, he states, at the request of the medical commissioner of the Local Government Board of Ireland, and described in a paper presented before the British Association at Sheffield.

When beef extract was compared with hard boiled egg added to the food, "it was found that from 8 to 10 times as much by weight of the latter was required to give the same increase in weight of animal or, expressed as dry organic solids in the two foods, from 2½ to 4 times as much egg white."

American catfishes: Habits, culture, and commercial importance, W. C. KENDALL (*U. S. Dept. Com. and Labor, Bur. Fisheries Doc. 733, pp. 39, pls. 10*).—In addition to descriptions of American catfishes, their food habits, the cultivation of catfishes, market fisheries, and related topics, the food qualities of the different sorts of catfishes are considered.

Wheat (*Jour. Bd. Agr. [London], 17 (1910), No. 3, Sup. 4, pp. 84, dgm. 1*).—Papers on wheat read at a meeting of the British Association for the Advancement of Science, held at Winnipeg, August, 1909, are here brought together. They include: On the General Economic Position of Wheat Growing and the Special Considerations Affecting the North-West of Canada, by P. G. Craigie; The Factors Determining the Yield of Wheat, by A. D. Hall and E. J. Russell;

The Breeding of Wheat, by R. H. Biffen; Wheat Breeding in Canada, by C. E. Saunders; The Influence of Good Seed in Wheat Production, by C. A. Zavitz; Individuality in Plants, by L. S. Klinck; Quality in Wheaten Flour, by A. E. Humphries; The Chemical Properties of Wheaten Flour, by E. F. Armstrong; An Analysis of the Factors Contributing to Strength in Wheaten Flour, by W. B. Hardy; Chemical Work on Canadian Wheat and Flour, by F. T. Shutt; A Comparison of the Baking Qualities of the Flour from Some of the Grades of Wheat Produced in the Western Provinces of Canada, by R. Harcourt; and The History of the Wheats, by O. Staff.

A brief summary of the discussion which followed the presentation of papers is also given.

On the strength of wheat flour, F. J. ALWAY and STELLA HARTZELL (*Nebraska Sta. Rpt. 1909, pp. 100–110*).—The rate of evolution of carbon dioxid during bread fermentation was studied and baking tests were made with a number of samples of flour used in an investigation previously reported (E. S. R., 19, p. 666), in comparison with samples of flour used as a standard.

As regards the evolution of gas, the authors point out that a marked similarity was noted in different flours from the same mill.

From the recorded data it is apparent that there was "no direct connection shown between the size of the loaf and the volume of gas evolved. The 13 flours which gave the largest loaves evolved on the average somewhat less gas than the other 13 flours.

"Allowing for all experimental errors, it seems at least improbable in view of the above that there is any marked connection, in the case of somewhat similar flours, between the size of loaf and the amount of gas evolved in incubation experiments. While we do not wish to imply that there are not valuable results to be derived from an exhaustive study along the lines of Wood's conclusion (E. S. R., 19, p. 457), any such study requires, in addition to the ordinary laboratory equipment, a skillful baker and a large oven.

"Most commercial flour-testing laboratories work on a small laboratory scale and in the case of flours from the same variety of wheat the results obtained are often of very doubtful value."

The color and ash content of different grades of Nebraska flour, F. J. ALWAY and V. L. CLARK (*Nebraska Sta. Rpt. 1909, pp. 26–30*).—With a view to securing data of value in determining the grade of flour, the authors determined the ash content and color of samples of so-called patent, straight, and bakers' grade flours from 11 mills.

Judged by their ash content in comparison with selected average values, none of the samples was below the grade reported by the millers. "In all cases the bakers' grade shows more ash than the straight grade from the same mill, and the straight shows more ash than the patent from the same mill. The same statement does not hold true when the samples from different mills are compared. The colors correspond to the grades, the bakers' grade in all cases showing a more or less gray tint. Most of the samples of the straight grade show a trace of gray, while none of the patents does. It is evident that these 11 sets may be considered strictly representative of the three grades requested. As these sets were selected by chance from the samples sent in by over 20 mills, it is safe to conclude that the large collections of flours dealt with [in a previous bulletin (E. S. R., 19, p. 666)] were as truly representative as could be desired."

The effects of bleaching upon the digestibility of wheat flour, E. W. ROCKWOOD (*Jour. Biol. Chem., 8 (1910), No. 4, pp. 327–340*).—In view of the fact that conflicting results have been obtained in studies of the digestibility of the constituents of wheat flour which has been bleached by nitrogen peroxid, the author carried on a number of artificial digestion experiments with samples of bleached and unbleached flour from the same lots.

"Moist, uncooked gluten was tested with pepsin-hydrochloric acid and that from bleached flour was found to digest as rapidly as, and in some cases more rapidly than, that from unbleached flour.

"Moist gluten was also digested with a pancreatin solution and that from bleached flour digested more readily than that from unbleached flour.

"Gluten from bleached flour, after it had been steamed and dried, digested somewhat more rapidly than that from unbleached flour. This was true with either the pepsin or the pancreatin solution.

"Bread made with yeast from bleached flour did not differ in digestibility from that from unbleached. The nitrite-reacting material largely or altogether disappears before the bread is removed from the oven.

"Boiled starch prepared from bleached and unbleached flour forms, by the action of pancreatin, reducing sugar at equal speeds. Tested with iodin there is no difference in the rapidity of starch digestion, either by pancreatin or by the salivary ferment. Diastase gives the same result."

About banana flour, J. von Sury (*Chem. Ztg., 34 (1910), No. 52, p. 463*).—A general discussion in regard to its composition and uses.

Banana flour as a food for infants, E. Pritchard (*Brit. Med. Jour., 1910, No. 2598, p. 1145*).—On the basis of his experience with it, the author recommends banana flour in the form of gruel or a decoction in infant feeding.

Concerning the composition and digestibility of different sorts of vegetables, J. Kochs (*Gartenflora, 59 (1910), No. 21, pp. 457–464*).—A summary and digest of data.

Examination of fruit grown in 1909, F. Härtel and J. Sölling (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 1, pp. 19–24*).—Analyses of fruit and fruit juices are reported.

Maple sugar, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 215, pp. 13*).—Of 138 samples of maple sugar collected in Canada 102 were found to be genuine, 22 adulterated, and 14 doubtful.

Ground coffee, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 216, pp. 22*).—Of 286 samples purchased as ground coffee, 260 were found genuine and 26 adulterated. Of the adulterated samples, 15 contained chicory as the only adulterant, and in amount not exceeding 10 per cent. The author believes it right to consider these samples technically adulterated, though "it is fair to assume that no intention to defraud the purchaser exists."

Occurrence of hyoscyamus seeds in poppy seeds, A. von Degen (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 12, pp. 705–720*).—As a result of the reports of various cases of poisoning after ingestion of food containing poppy seed, the author estimated the amount of hyoscyamus seeds in various samples of poppy seed, but found the amount of hyoscyamin which would be ingested was altogether too low to be toxic or lethal. However, he makes several recommendations to prevent the contamination of poppy seeds with hyoscyamus seeds.

Report of the department of food and drugs, state board of health, for June, July, and August, 1910, H. E. Barnard (*Mo. Bul. Ind. Bd. Health, 13 (1910), Nos. 6, p. 63; 7, p. 75; 8, pp. 88, 89*).—Data are given regarding the examination of a large number of samples of canned goods, flavoring extracts, and other food materials, as well as drugs and paint.

Preliminary report of the dairy and food commissioner for the year 1909, J. Foust (*Penn. Dept. Agr. Bul. 194, pp. 59*).—This bulletin contains a discussion of the year's work, data regarding the number and kind of products examined under the state pure food law, the text of that law, and other legal material.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 570–571, pp. 2 each; 572, p. 1; 573–574, pp. 2 each; 575, pp. 4; 577–578, pp. 2 each; 579–581, p. 1 each; 583, p. 1; 584, 585, pp. 2 each; 589, p. 1; 591–594, p. 1 each; 595–599, pp. 2 each; 600, pp. 11; 601–603, pp. 2 each; 604–605, p. 1 each; 606, pp. 2*).—These notices of judgment have to do with the adulteration of olives and raisins; the misbranding of headache tablets, rice meal, sugar-glucose jelly, preserves, asafetida, cider vinegar, dried apricots, a soft drink containing cocaine, whisky, a drug compound, macaroni, olive oil, and a drug product; and the adulteration and misbranding of vinegar, a drug, gum tragacanth, olive oil, peroxid of hydrogen, lemon extract, maple sirup, peach butter, tomato catsup, and a jam compound.

Officials charged with the enforcement of food laws in the United States and Canada (*U. S. Dept. Agr., Bur. Chem. Circ. 16, rev., pp. 39*).—This list of officials arranged by States has been revised to July 1, 1910.

Inspection of imported meats and meat food products under the Food and Drugs Act of June 30, 1906 (*U. S. Dept. Agr., Bur. Chem. [Pamphlet], 1910, Oct. 3, pp. 14*).—This circular was prepared in order that customs officials may be informed as to the proper form of certificate and as to the names of officials qualified to sign certificates. Forms of certificates are included and a list of officials entitled to sign them.

Ohio food and drug laws, 1910, compiled by R. W. Dunlap (*Columbus, 1910, pp. 54*).—The Ohio food and drug laws are included in this compilation, together with sanitary inspection, liquor traffic tax, and weights and measures laws.

Application of the food adulteration law of August 1, 1905, A Fallières (*Rec. Actes Off. et Doc. Hyg. Pub., Trav. Cons. Hyg. Pub. France, 38 (1908), pp. 94–109*).—Legislative enactments are presented regarding the administration of the French pure food law.

Principles of domestic science applied to preparation of food, Neale S. Knowles (*Penn. Dept. Agr. Bul. 188, pp. 42, pls. 4*).—The choice and preparation of foods and other such topics are discussed in this popular summary of data on food and nutrition. Many recipes are included.

The history, development, and statistics of milk charities in the United States, J. W. Kerr (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 25 (1910), No. 39, pp. 1351–1367; reprint No. 50, pp. 22*).—Statistical and other data are summarized.

The feeding of school children, Louise S. Bryant (*Dietet. and Hyg. Gaz., 26 (1910), No. 9, pp. 527–536, dgm. 1*).—A summary of historical and experimental data on this subject.

The food requirements of growing children, E. W. and L. C. Rockwood (*Proc. Amer. Soc. Biol. Chem., 1 (1909), No. 5, p. 239; Science, n. ser., 32 (1910), No. 819, pp. 351, 352*).—The food eaten by 2 boys in good health, aged respectively 9 and 13 years and weighing 27.4 and 50.5 kg., was recorded for a period of 29 days and the composition obtained by calculation. The diet was plain but wholesome and the quantities eaten, it is stated, were those usually consumed by the subjects. The food which the elder consumed supplied 87.8 gm. protein per day, with an energy value of 2,992 calories, and the diet of the younger 63 gm. protein per day, with an energy value of 2,051 calories.

Studies of the food of the Finnish people, S. Sundström (*Bidr. Känn. Finlands Natur och Folk, 1908, No. 67, pp. IV+230, dgms. 9*).—A large number of dietary studies and 12 digestion experiments are reported which were made in families of country people and laborers in different parts of Finland, the work including many analyses.

In general, the author concludes that the use of average figures for computing the composition of food may involve a considerable amount of error, but that the calculation of the energy value gives results which are in fair accord with actual determinations. According to his studies, the diet of an adult Finnish peasant engaged in moderately severe muscular work supplies some 4,000 calories, while that of a woman at moderate work supplies 2,700 or 2,800 calories. The diet of a 2 or 3 year old child supplies 1,000 calories per day, with an increase of about 200 calories for each year's increase in age. On an average, the diet of an adult man supplies 136 gm. protein, 83 gm. fat, and 580 gm. carbohydrates per day, and is made up chiefly of flour or other cereal products and potatoes with small amounts of meat, fish, or bacon, and milk. On an average, 84 per cent of the protein, 90 per cent of the fat, and 95 per cent of the carbohydrates of the diet are digested. Variations in the diet in different regions, methods of preparing food, and other similar questions are considered.

Proteins: The relations between composition and food value, E. F. Armstrong (*Rpt. Brit. Assoc. Adv. Sci., 1909, pp. 459–461*).—The author sums up as follows his paper presented at the 1909 meeting of the British Association for the Advancement of Science:

"When discussing the value of foods it is not enough to know merely the gross amount of nitrogen-containing matter, but the nature and proportion of its constituent units must also be taken into account. The ideal diet should contain as great a variety of proteins as possible in order to provide a sufficient amount of all the required units of constructive metabolism."

A comparative study of the digestibility of natural and fermented milk by adults, F. Samarani (*Ann. R. Staz. Sper. Caseif. Lodi, 1909, pp. 35–106, dgm. 1; abs. in Rev. Gén. Lait, 8 (1910), No. 14, pp. 328–332*).—Experiments were made with man and animals, the general conclusion reached being that, considered from the standpoint of its digestibility by adult man, fermented milk possesses physical-chemical characteristics which render it superior to natural milk.

The digestibility of milk preparations by man, K. Thomas (*Arch. Anat. u. Physiol., Physiol. Abt., 1909, pp. 417–429; abs. in Chem. Zentbl., 1910, I, No. 25, p. 2027*).—The author was himself the subject of experiments on the digestibility of whole milk, casein, milk curd precipitated with rennet, dried skim milk, and a dried preparation made from whole milk and kefir. Precipitated and finely divided casein was more completely digested than whole milk. The dried milk preparations were as well assimilated as fresh milk. The kefir showed a higher resorption of fat than natural milk.

Concerning potassium metabolism, E. Biernacki (*Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 5 (1910), No. 11, pp. 401–408*).—The author discusses potassium metabolism and reports the results of investigations on this subject.

If the amount of sodium chlorid in the diet is increased, the potassium excretion is also increased, and vice versa. He concludes therefore that under the influence of large doses of sodium chlorid the body can lose correspondingly large quantities of potassium. He also concludes that there is hardly any doubt that when the body weight increases there is a tendency for the potassium excretion to increase, and such an increase usually takes place. This has an obvious relation to the theory that has been advanced regarding the rôle of potassium in the organism with reference to carbohydrate metabolism, lowering the potassium content of the body and consequently diminishing the carbohydrate cleavage being naturally related to fat formation and gains in weight.

Potassium is entirely different from sodium in its relation to fat formation in the body. In the author's experiments increased excretion of sodium was never noted when continued gains in weight were made. In the light of recent observations he considers that potassium should be regarded as a labile element which rapidly leaves the body, and in this respect is the opposite of sodium and calcium.

The effects of a restricted diet and of various diets upon the resistance of animals to certain poisons, R. HUNT (*Pub. Health and Mar. Hosp. Serv. U. S., Hyg. Lab. Bul. 69, pp. 93*).—Dogs and small animals were used in these experiments.

Quotations from the author's summary follow:

"Diet has a marked effect upon the resistance of animals to certain poisons; the resistance of some animals may be increased forty fold by changes in diet.

"Certain diets, notably dextrose, oatmeal, liver, and kidney, greatly increase the resistance of mice to acetonitril; their effect is similar in this respect to the administration of thyroid.

"The effect of an oatmal diet in increasing the resistance of certain animals to acetonitril is probably due in part to a specific effect of the diet upon the thyroid gland; this is an illustration of how an internal secretion may be modified in a definite manner by diet. . . .

"Season has an important effect upon the resistance of animals to certain poisons; in some cases these effects seem to depend upon seasonable variations in the activity of the thyroid.

"The experiments show that foods such as enter largely into the daily diet of man have most pronounced effects upon the resistance of animals to several poisons; they produce changes in metabolism which are not readily detectable by methods ordinarily used in metabolism studies. The ease and rapidity with which certain changes in function are caused by diet are in striking contrast with the essentially negative results obtained by the chemical analyses of animals fed upon different diets."

The influence of the salts in drinking water on physical development, R. BERG (*Biochem. Ztschr., 24 (1910), No. 3–5, pp. 282–303; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 571, II, pp. 425, 426*).—The author includes data collected by C. Röse and supplements them by the results of his own investigations.

According to his conclusions the harder the drinking water of a district the better the physical development of the children. The conclusions were principally drawn from the examination of the condition of the teeth. The composition of the saliva was also studied with reference to the effect of drinking waters of varying hardnesses, and diets containing varying amounts of calcium. According to the author, the amount of saliva excreted increases with the hardness of the water, and children who habitually drink hard water secrete a saliva both relatively and absolutely more alkaline than is the case with children in neighborhoods supplied with soft water. Other characteristics of the saliva were also studied.

Food poisoning, E. SACQUÉPÉE (*Les Empoisonnements Alimentaires. Paris, 1909, pp. 95*).—In this monograph the author considers gastro-intestinal poisoning, namely, that due to *Bacillus enteritidis* and allied forms, as communicated by meat from diseased animals, animals overworked, cakes with cream filling, etc.; typhoid poisoning due to *Proteus vulgaris*, as communicated by meats or potato; poisoning due to *Bacterium coli;* that due to preserved meats and related topics. Botulism, treatment of food poisoning cases, prophylaxis, and general matters pertaining to the subject are also discussed.

On the metabolism experiment as a statistical problem, H. L. Rietz and H. H. Mitchell (*Jour. Biol. Chem., 8 (1910), No. 4, pp. 297–326*).—The authors discuss the interpretation from a mathematical standpoint of the results of physiological experimenting, particularly in component results such as a standard deviation, by the application of the so-called "probable error" obtained from Gauss' exponential equation.

"Not only is the probable error a convenient criterion for the evaluation of experimental results in metabolism, but it is a necessary criterion that must, in many cases, be applied before definite, especially quantitative or general conclusions, may legitimately be deduced.

"It follows, therefore, that experiments in this field should be so planned as to conform the most strictly with the requirements for the application of the law of probability and to yield the most valuable results as judged by this method.

"Under such conditions, we may confidently expect that the laws of probability, together with the various mathematical methods for reducing statistical data in common use among statisticians, will render a tremendous service to physiology and physiological chemistry as they have to such problems of general biology as heredity and evolution. Further, we do not hesitate to predict that, by the use of such methods, a greater degree of exactness and precision and, conversely, a narrower field for the exercise of unaided judgment or biased opinion in the interpretation of experimental data will result, fully repaying the extra labor and care involved in conforming to the requirements of these methods."

A respiration apparatus for the study of isolated organs and for use with small animals, O. Cohnheim (*Ztschr. Physiol. Chem., 69 (1910), No. 2, pp. 89–95*).—The apparatus, which is briefly described, is of the closed-circuit type and constructed on the principle of the Atwater-Benedict apparatus. The method of operation and sources of error are considered.

ANIMAL PRODUCTION.

The kudzu vine as a forage crop (*Rural New Yorker, 69 (1910), No. 4068, p. 963, figs. 3*).—The experience is reported of a farmer in Florida who has grown the kudzu vine (*Pueraria thunbergiana*) as a forage crop and thinks it superior to cowpeas or velvet bean for hay or pasture. Four different cuttings were made as follows: May 1, at the rate of 3.63 tons; June 12, 2 tons; July 30, 2.89 tons; and September 18, 2.43 tons of dried hay per acre, making a total of 10.95 tons in one season. Analysis of the first cutting showed that it contained 17.6 per cent protein and 34.33 per cent carbohydrates; of the third cutting, 14.8 per cent protein and 35.05 per cent carbohydrates.

Observations on the use of cactus for feeding animals, E. Baillaud (*Jour. Agr. Trop., 10 (1910), No. 111, pp. 257–262*).—A summary of feeding tests, in which cactus constituted a part of the ration.

Alfalfa hay for hogs, J. M. Evvard (*Nat. Swine Mag., 5 (1910), No. 1, pp. 5–7, figs. 2*).—A popular summary of information on the value of alfalfa hay for swine feeding.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 582, 608, p. 1 each*).—These relate to the adulteration and misbranding of oats and the misbranding of alfalfa meal.

Biological observations on the growth of animals at pasture, Falke (*Biologische Beobachtungen über das Wachstum der Weidetiere. Hanover, 1910, pp. 23; rev. in Zentbl. Allg. u. Expt. Biol., 1 (1910), No. 7–8, p. 271*).—The increase in height of cattle at pasture was often more rapid than the gain in weight.

Young animals made faster relative gains, while older cattle made higher absolute gains. The nature of the winter feeding affected the gains made during the first few weeks at pasture in the spring.

Influence of feed on the strength of bone, G. LAURER (*Deut. Landw. Tierzucht, 14 (1910), No. 37, pp. 437–439*).—The experimental animals used were 19 cattle of the Kellheimer breed, which were kept on 3 different farms where the soil was deficient in lime. When compared with gains made in height at the withers and in length of leg, the gains in circumference of the leg were greater both relatively and absolutely when a hay ration rich in calcium and phosphorus was fed than when the roughage consisted principally of straw which was deficient in these elements.

The relation of the breaking strength of hog bones to the composition of the ash, F. J. ALWAY and W. L. HADLOCK (*Nebraska Sta. Rpt. 1909, pp. 31, 32*).—The composition of the ash of weak and strong bones (E. S. R., 20, p. 868) was found to be practically the same, thus indicating that the nature of the feed had no effect upon the relative proportion of the different mineral constituents of bones.

A contribution to the knowledge of the stomach digestion in horses with normal rations and with the customary rations of army horses, A. SCHATTKE (*Ein Beitrag zur Kenntnis der Magenverdauung des Pferdes bei Normaler, bei den Militärpferden üblicher Fütterung. Inaug. Diss., Univ. Leipsic, 1909, pp. 50; rev. in Zentbl. Physiol., 24 (1910), No. 7, pp. 283, 284; Jahrb. Wiss. u. Prakt. Tierzucht, 5 (1910), pp. 175, 176*).—There was an acid reaction in all parts of the stomach 90 minutes after feeding; previous to that time, the esophogeal portion gave an alkaline or neutral reaction. In ½ hour after eating, syntonin, albumose, peptone, and other degradation products were found in all parts of the stomach. Water passed quickly to the intestine, and hence did not affect the digestion process in any way. The digestion of carbohydrates was not localized, although it was most rapid in the esophogeal portion.

On the influence of the movements of the body on digestion in swine, H. STAMBKE (*Über den Einfluss der Körperbewegung auf die Vardauung des Schweines. Inaug. Diss., Univ. Bern, 1909; rev. in Zentbl. Physiol., 24 (1910), No. 7, p. 284; Jahrb. Wiss. u. Prakt. Tierzucht, 5 (1910), p. 174*).—Moderate exercise checked the muscular contractions of the walls of the stomach but not those of the intestines. As previously found in horses, moderate exercise hastened the process of digestion in the stomach and intestines.

Influence of the genital glands on the formation of glycogen, F. MAIGNON (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 11, pp. 721–724; abs. in Zentbl. Allg. u. Expt. Biol., 1 (1910), No. 4–5, pp. 139, 140*).—As the maximum content of glycogen in the muscles of guinea pigs, pigeons, and carp occurs in the spring, and as the muscles of female guinea pigs and carp are richer in glycogen than those of males, experiments were undertaken to ascertain if the genital glands were an influential factor.

Desexing guinea pigs lowered the glycogen content of males but not that of desexed females. Ingestion of testicular secretions increased the amount in normal males, but not in females nor in castrated males. Hence, it is concluded that testicular activity increased the glycogen content.

The literature of the Darwin centenary, 1908–1910, W. MAY (*Zool. Zentbl., 17 (1910), No. 9–10, pp. 258–276*).—A bibliography, with short reviews of 75 books or articles relating to the influence of Darwin's work, on the study of the evolution of species, hybridizing, inheritance, and related topics of special interest to students of heredity.

The domesticated animals in development and inheritance, HILZHEIMER (*Naturw. Wegweiser, 11 (1910), Ser. A, pp. 127, pl. 1, figs. 56; abs in Jahrb.*

Wiss. u. Prakt. Tierzucht, 5 (1910), pp. 188, 189).—An outline of the ancestry of domesticated animals and a history of domestication.

The origin of domesticated animals, KRONACHER (*Mitt. Deut. Landw. Gesell., 25 (1910), No. 19, pp. 281–285*).—A review of the numerous theories which have been suggested as to what first led man when in a state of savagery to capture, train, and enslave wild animals.

[Remains of domesticated animals in Netherland mounds], L. BROEKEMA (*Cultura, 20 (1908), No. 244, pp. 721–724, pl. 1; 21 (1909), No. 246, pp. 57–59, pls. 2; Mitt. Deut. Landw. Gesell., 24 (1909), Nos. 3, pp. 35, 36; 32, pp. 507–509; 25 (1910), Nos. 12, pp. 181–183; 13, pp. 196–198; figs. 12*).—Illustrations and descriptions of bones found in the ancient mounds of Groningen and Friesland are given, including those of horses, horned cattle, polled cattle, and a 4-horned sheep skull. The skeleton of the prehistoric horse of Holland apparently was much like that of the Turkestan horse. The horned cattle were those of *Bos brachyceros*, but apparently these mound dwellers possessed several varieties of cattle.

The ancestry of the gray Steppes cattle in the light of previous investigations and recent archæological discoveries in southern Russia, A. BEREKOWSKI (*Die Abstammung des grauen Steppenrindes im Lichte der Bisherigen Untersuchungen und der Letzten Archeologischen Funde ni Südrussland. Krakow, 1908; rev. in Jahrb. Wiss. u. Prakt. Tierzucht, 5 (1910), p. 288*).—Recent investigations in southern Russia confirm the view that the gray Steppes cattle are direct descendants of *Bos primigenius*, which was domesticated in that vicinity.

The cattle breeding question in Roumania, N PROTOPOPESCU (*Die Rinderzuchtfrage in Rumänien. Inaug. Diss., 1909, pp. 116; rev. in Zentbl. Allg. u. Expt. Biol., 1 (1910), No. 1, pp. 39, 40*).—A short account of the agriculture of Roumania, with special reference to animal industry.

There are two main types of Roumanian cattle, the plains cattle of *primigenius* ancestry and the mountain breeds of *longifrons* type. The plains cattle are divided into 3 principal breeds, the Moldau, Buscan, and Jalomitza. Crosses of the Moldau and Simmental produced offspring which made heavier gains in flesh and a better dairy animal than pure native stock. Similar results were obtained with crosses made between the Moldau and Swiss cattle. It is recommended for the improvement of the Roumanian cattle that crosses be made with the Simmental and Swiss breeds.

The blue breed of the North, R. DUMONT (*Jour. Agr. Prat., n. ser., 20 (1910), No. 35, pp. 279–282, fig. 1*).—A description of the characteristics of a sub-Belgian breed of cattle, which originated from crosses of Dutch, Durham, and native Belgian breeds.

The Bavarian red cattle, O. GUTH (*Arb. Deut. Gesell. Züchtungsk., 1910, No. 6, pp. 124, pl. 1, figs. 17*).—The topics treated in this monograph are relation of cattle breeding to other industries, principles of breeding, characteristics of the Bavarian red breed of cattle, and methods of management as practiced in regions where these cattle are bred. It is thought that better results would be obtained by improving this general purpose breed in such regions as the Upper Palatinate rather than by importation of foreign breeds. Many measurements of this breed are given, and there are numerous references to the literature on the subject.

Cattle breeding in Sind, G. S. HENDERSON (*Agr. Jour. India, 5 (1910), No. 2, pp. 144–152*).—An account of the types of cattle and the present status of cattle breeding, including the methods of management and a list of native and introduced forage plants.

A partial list of owners of pure-bred live stock in New York State (*N. Y. Dept. Agr. Bul. 17, pp. 49*).—This is an alphabetical list of the owners of the important breeds of horses, cattle, sheep, and swine. The number of pure-bred live stock of different kinds is given for each county in the State.

Annual reports of the live stock associations of Ontario (*Ann. Rpts. Live Stock Assocs. Ontario, 1910, pp. 208*).—Included with the usual material which makes up this report there are concise definitions of breed types of the principal breeds of domesticated animals in Canada.

[Animal husbandry in the Belgian Congo], É. DE WILDEMAN (In *Compagnie du Kasai, Mission Permanente d'Études Scientifiques: Résultats de ses Recherches Botaniques et Agronomiques. Brussels, 1910, pp. 157–177*).—An account of the general conditions in that colony for the development of animal industry.

[Cattle raising in Panama], A. G. SNYDER (*Daily Cons. and Trade Rpts. [U. S.], 13 (1910), No. 101, pp. 402, 403*).—The cattle industry of Panama is confined chiefly to the Province of Chiriqui. The number of cattle is estimated to be about 30,000, and these are descendants of the old Spanish stock. The province is well watered and abounds in good pastures. The price of cattle shipped to Panama, where about 5,000 are consumed annually, varies from $32 to $35 per head, while breeding cattle bring about $15. There are about 12,000 horses and mules in the province, while sheep are practically unknown.

"The acclimatization of breeding cattle can be carried on under favorable conditions by choosing a cooler climate in the Cordilleras than exists on the coast, but no one has cared to attempt this, owing to the capital required. Suitable territory abounds in the province awaiting the proper initiative and capital. A few short-horned Durhams and Holstein-Friesians exist in this province, due to the efforts of a few cattlemen to improve their stock. A little more than a year ago the National Government attempted to awaken an interest in the improvement of native breeds by the introduction and sale at public auction of a few head of fine stock."

[Sheep and cattle in Greece], PERKINS (*Jour. Dept. Agr. So. Aust., 14 (1910), No. 2, pp. 112–116*).—A general account of the animal husbandry of Greece.

Cattle are not kept to any extent except as draft animals and there are few work horses. Pigs are not numerous, and such as are kept have large heads and lean flanks and are leggy. Sheep and goats are the typical live stock of the country and are kept principally for milk. Details are given concerning the characteristics and management of the sheep.

The so-called "stone sheep" of the Austrian Alps, L. FÜHRER (*Österr. Molk. Ztg., 17 (1910), Nos. 17, pp. 230–232; 18, pp. 241–243*).—A description of the characteristics and methods of management of a long-staple, medium-sized breed which is common in that region. Recently crosses have been made with English Hampshires in order to improve the meat and wool qualities of the native breed.

The live stock industry in California, P. PARKER (*Pacific Rural Press, 80 (1910), No. 3, pp. 41, 55, fig. 1*).—A historical account of the remarkable growth of the sheep industry in California, which in 1852 had only 38,000 sheep but by 1863 had risen to third place among the States of the Union in wool production.

[Notes on wool], H. D. BAKER (*Mo. Cons. and Trade Rpts. [U. S.], 1910, No. 357, pt. 2, pp. 207–211*).—It is stated that there is a loss of $1,215,000 per annum because of the presence of twine and vegetable fibers in wool. A new process of packing the bales of wool, which prevents the twine from entering, is described.

According to this article, Prof. J. Park, of the Otago University School of Mines, has been studying the problem of spontaneous combustion in wool fiber, and finds the cause to be heat generated by compressing the air into the wool. As a remedy he suggests that the pressing be done in a vacuum cylinder or chamber, so that all of the air in the wool will be displaced before pressing.

Data are given concerning the imports to the United States of fine wools from Australia, and the different varieties of carpet wools from Asiatic Turkey.

A contribution to the history of horses, M. HILZHEIMER (*Deut. Landw. Presse, 36 (1909), Nos. 87, pp. 927, 929, 930; 89, pp. 948–950, figs. 14; abs. in Jahrb. Wiss. u. Prakt. Tierzucht, 5 (1910), pp. 284, 285*).—A discussion of data concerning the prehistoric horse in Europe. The author believes in a polyphyletic origin of the domesticated horse, and also that the oriental horse of the pile works was domesticated in Gaul and migrated by way of Spain to northern Africa and Egypt.

Polydactylism in solid-hoofed animals, H. LINDEMANN (*Über Polydaktylie beim Einhufer. Inaug. Diss., Univ. Leipsic, 1909, pp. 50, pls. 2; rev. in Jahrb. Wiss. u. Prakt. Tierzucht, 5 (1910), pp. 190, 191*).—A discussion of polydactylism in the prehistoric ancestors of single-toe hoofed mammals and a study of cases reported where extra digits have occurred in recent times, especially in horses.

Of the cases which have been sufficiently described it was found that 36.96 per cent were atavistic, that is, when the structure and position of the extra digits were such that they could be correlated as reduced digits of a polydactyl ancestor all other cases were considered to be of teratological origin. Of the cases reported 48.65 per cent occurred on the right fore limb and 28.05 per cent on the left fore limb; 60.21 per cent occurred on 1 leg only, 23.66 per cent on 2 legs, and 16.13 per cent on 4 legs.

A bibliography is appended.

Studies on the diluvial and prehistoric horse of Poland, A. BEREBOWSKI (*Studien über Diluviale und Prähistorische Pferde in Polen. Krakow, 1909; rev. in Jahrb. Wiss. u. Prakt. Tierzucht, 5 (1910), p. 284*).—Bones of horses found in the diluvial deposits and caves of Poland were found to be similar to oriental types, the French horse of the Solutré period, and the horse of the Swiss lake dwellers, as well as to the modern horse of Polish peasants.

The restoration of an ancient British race of horses, J. C. EWART (*Proc. Roy. Soc. Edinb., 30 (1909–10), No. 4, pp. 291–311, figs. 27*).—A study of equine bones found in the Roman fort at Newstead, England, led to the conclusion that this horse was nearly a pure descendant of the slender-limbed race which in Pliocene times inhabited Italy and France, and in Pleistocene times ranged from north Africa to England. The name originally suggested for this species by the author was *Equus gracilis* (E. S. R., 21, p. 672), but as this name was not found to be available, *E. agilis* has been adopted. There are apparently 2 types of this species, the northern or *celticus*, and the southern or *libycus*.

Crosses were made of ponies representing Exmoor, Connemara, Barra, Shetland, Faroe, Iceland, Norse, Russian, Battak, Java, and Arab breeds. Of some 40 crosses eventually produced some were found to be of the robust "forest" type (*E. robustus*), some were a blend of the "forest" and "plateau" types (*E. agilis*), and in others there was a suggestion of the Steppes type (*E. przewalskii*).

"The results strongly suggest that the ponies of northwestern Europe are mainly a blend of a coarse-limbed, broad-browed, short-faced race of the 'Elephant Bed' or Solutré type, and a fine-limbed race characterized by a fine muzzle and short-pillared molars, a race (like asses and zebras) without hind chestnuts and (unlike asses and zebras and the wild horse of Mongolia) without fetlock callosities or ergots. . . . It thus appears that by mixing the blood of Connemara, Shetland, and Arab ponies, animals are soon obtained which in the teeth and limbs are practically identical with the 12.2 hands Newstead horse—a horse which in its molars agrees with the small fossil Oreston race, and in its cannon bones with the fine-limbed fossil horse of Kent's Cave, Torquay."

Measurements and illustrations are submitted which demonstrate the difference between the species discussed.

On the fertility of the hybrids of the domestic horse.—The zebroids and hybrids of the horse and Equus przewalskii, I. Ivanov (*Izv. Imp. Akad. Nauk (Bul. Acad. Imp. Sci. St. Petersb.), 6. ser., 1910, No. 10, pp. 771–774*).—Microscopical examinations were made of the seminal fluid, collected by the sponge method, of a zebroid horse hybrid raised at the Askania Nova park, and found to be free from spermatozoa, contrary to Ewart's observations. Both sexes were fertile in offspring from crosses between the domestic horse and *E. przewalskii* and the spermatozoa were similar in form to those of the domestic horse.

Zebras and zebroids, E. Trouessart (*Nature [Paris], 38 (1910), No. 1944, pp. 194–198, figs. 4*).—An account of the zebras and zebra hybrids in the Museum of Natural History of Paris.

[Color correlation in the hair and hoof], Dupon (*Maréch. Franc., 1909, No. 653; abs. in Jahrb. Wiss. u. Prakt. Tierzucht, 5 (1910), pp. 328, 329*).—From careful observations of many animals the author thinks there is a correlation between coat color and hoofs. The hoofs of black and of red horses are often brittle and dry, while in gray and roan horses the horn of the hoof is usually gray in color and of better quality. Horses with white feet usually have a white horn, which is less liable to injury from atmospheric influences and from shoe nails driven into the horn while shoeing.

On the inheritance of color in the American harness horse, A. H. Sturtevant, Jr. (*Biol. Bul. Mar. Biol. Lab. Woods Hole, 19 (1910), No. 3, pp. 204–216*).—A discussion of the pigments present in the coat color of horses, and a report on the study of the inheritance of coat color obtained from an examination of the official records of the pedigrees of blooded trotters. The chestnut factor which was present in all cases was hypostatic to black; black was hypostatic to bay, roan, or gray. The relation of roan and gray to each other was uncertain, but either one of them is epistatic to bay.

Points of a Clydesdale draft horse, P. R. Gordon (*Queensland Agr. Jour., 23 (1910), No. 4, pp. 213–215, pls. 2*).—A detailed statement by an expert judge of the Clydesdales in Queensland of the score-card used, which differs from most of those used in the United States because pedigree and offspring count for 8 points each.

The origin of the Percheron horse, A. Gallier (*Jour. Agr. Prat., n. ser., 18 (1909), No. 32, pp. 209–211, fig. 1; abs. in Jahrb. Wiss. u. Prakt. Tierzucht, 5 (1910), p. 286*).—As the author does not find any record in the seventeenth or eighteenth centuries of a horse resembling the Percheron, he considers it a new breed resulting from a cross between a large Norman and the oriental horse, influenced somewhat by food, climate, and selection.

Breeding horses for use, or equine eugenics, F. Ram (*London, 1909, pp. 19*).—The author contends for a more rational method for selecting breeding stock if horses are to be improved. It is emphasized that horses for the English army should be selected for hardness and capacity for service rather than on the present-day empirical methods of judging by unimportant "points."

Report on horse breeding, Granard et al. (*Rpt. Roy. Com. Horse Breeding [Gt. Brit.], 12 (1908), pp. XIV+14; 13 (1910), pp. 19*).—These reports recommend measures that should be undertaken by the government for the improvement of horse breeding.

Horse breeding in Finland, FABRITIUS (*Ztschr. Gestük., 1909, No. 7–9; abs. in Jahrb. Wiss. u. Prakt. Tierzucht, 5 (1910), pp. 319, 320*).—An account of horse breeding in Finland from early records to the present time. The average measurements of the improved Finnish horses are given as follows: Height at the withers 153 cm., length of body 161.6 cm., depth of chest 71.8 cm., girth 188 cm., width of chest 45.7 cm., width of rump 56.4 cm., and circumference of cannon bone 20.5 cm.

Directory of the stallions registered with the Pennsylvania Live Stock Sanitary Board for the year 1909, C. W. GAY (*Penn. Dept. Agr. Bul. 187, pp. 85*).—This contains a list of the registered stallions of each county of the State, and contains a review of the work that has been accomplished by the State Live Stock Sanitary Board in the registration of stallions under the act of 1907. The benefits of the law are demonstrated by the increase in the number of pure-bred stallions enrolled during 1909, which is 823 against 666 for 1908. There were 1,427 grade licenses issued, as compared with 1,336 during 1908.

Measuring horses, H. KRÄMER (*Mitt. Deut. Landw. Gesell., 25 (1910), No. 13, pp. 191–194; abs. in Zentbl. Allg. u. Expt. Biol., 1 (1910), No. 7–8, p. 265*).—A discussion and criticism of the different methods of measuring horses.

Anatomical-mechanical investigations on the cause of the sloping croup in horses, U. DUERST (*Deut. Landw. Tierzucht, 13 (1909), No. 9–10; abs. in Jahrb. Wiss. u. Prakt. Tierzucht, 5 (1910), pp. 159–161*).—The significance and method of measuring the slope of the croup is discussed on purely anatomical grounds, the conclusion being drawn that a horizontal croup is desirable in the fast horse and a sloping croup in the draft horse.

The classification of horses into oriental and occidental types by the slope of the croup is held to be unsound. The study of the hare and deer shows that there is a correlation between the anatomy of the hind quarters and the physiographic environment. Those living on plains have a horizontal croup, while those inhabiting mountain districts have a sloping croup.

Historical studies of horse shoeing, P. HAAN (*Rev. Gén. Méd. Vét., 12 (1908), No. 137–138, pp. 233–271, figs. 21; abs. in Jahrb. Wiss. u. Prakt. Tierzucht, 5 (1910), p. 287*).—A review of the literature on the history of shoeing horses. There are many illustrations of ancient forms of shoes.

Horse shoeing in Finland, BRÜNING (*Hufschmied., 1909, No. 8; abs. in Jahrb. Wiss. u. Prakt. Tierzucht, 5 (1910), p. 329*).—The history of the horseshoe in Finland, from the eighth century to the present time.

Swine husbandry (*Penn. Dept. Agr. Bul. 186, pp. 127, figs. 26*).—A general work on breeds, breeding, feeding, and management of swine. About 50 pages are devoted to a résumé of the results of feeding tests conducted at the state stations.

Biggle poultry book, J. BIGGLE (*Philadelphia, 1909, pp. 162, pls. 16, figs. 75*).—A concise and practical treatise on the management of farm poultry.

Experiments in artificial incubation, R. ULRICH (*Süddeut. Landw. Tierzucht, 4, No. 4; abs. in Jahrb. Wiss. u. Prakt. Tierzucht, 5 (1910), pp. 353, 354*).—The percentage of chicks hatched with different incubators ranged from 37.5 to 71.7 per cent of the eggs showing embryos on the sixth day, and from 54.5 to 90.7 per cent of those showing living embryos the nineteenth day. One hundred per cent of the fertile eggs of partridges and pheasants hatched.

A knife for killing poultry, H. C. PIERCE (*U. S. Dept. Agr., Bur. Chem. [Leaflet], 1910, June 22, p. 1, fig. 1*).—The desirable features of the knife for bleeding poultry are discussed, and directions for making a suitable knife from an old file are given.

DAIRY FARMING—DAIRYING.

Dairy farming in the East, G. A. Billings (*N. Y. Tribune Farmer, 9 (1910), Nos. 465, p. 11; 466, pp. 11, 18, fig. 1*).—The importance of a cropping system for eastern dairy farms is pointed out and the profit in home-grown feeds is shown from data obtained by the Office of Farm Management of this Department. The relative values of different crops that may be grown on the farm for feed are discussed, and illustrations are given of the methods for computing rations for dairy cows.

Methods and formulas for estimating the milking capacity of cows, E. Reggiani (*Indus. Latt. e Zootec., 8 (1910), Nos. 6–7, pp. 111–113; 9, pp. 155, 156; 10, pp. 176, 177*).—A review of methods which have been proposed by Guènon and several other investigators who have attempted to judge the annual milk production of a cow by means of "points" or formulas.

The Holland stables for milking cows, H. M. Kroon (*Trans. IX. Internat. Vet. Cong. The Hague, 1 (1909), S. G. XII, 2, pp. 21, figs. 6*).—A report of types of cow stables in Holland. The ditch cow stable common in the eastern and southern provinces, the Friesian stable, and the North Holland stable are illustrated and described. It is stated that the last type is the only one that can be recommended for the production of sanitary milk.

The construction of stables in relation to the prophylaxis of diseases of animals—especially tuberculosis—and also on the hygiene of milk, J. S. Lloyd (*Trans. IX. Internat. Vet. Cong. The Hague, 1 (1909), S. G. XII, 3, pp. 25*).—A report on the points to be considered in building cow stables in Great Britain.

Can clean milk be produced at small cost? P. G. Heinemann (*Hoard's Dairyman, 41 (1910), No. 42, pp. 1223, 1224, figs 6*).—A description of buildings and equipment essential for producing sanitary milk containing not more than from 1,000 to 2,000 bacteria per cubic centimeter when delivered for consumption more than 100 miles away. It is estimated that such milk bottled and ready for shipment can be sold at a profit for 6 cts. per quart in a plant where the output is 250 qt. per day.

Preliminary report on the tuberculin test as applied to a city's milk supply, G. W. Goler (*Amer. Jour. Pub. Hyg., 20 (1910), No. 1, pp. 92–97*).—A paper read at the meeting of the American Public Health Association, Richmond, Va., in October, 1909, which contains an outline of a practical method for dealing with this problem.

The arrangement and phrasing of public health regulations, G. M. Whitaker (*Amer. Jour. Pub. Hyg., 20 (1910), No. 1, pp. 8–13*).—This article constitutes part of a paper read before the Iowa Association of Health Officers, October, 1909, in which principles are laid down for observance in framing laws and ordinances relating to the sale of milk and its products.

The holding method of milk pasteurization, C. E. North (*Engin. News, 63 (1910), No. 19, pp. 570–572, figs. 3*).—A discussion of the requirements of apparatus used for the successful pasteurization of milk, with special reference to the storage tank for holding the heated milk a sufficient length of time to destroy tubercle bacilli without overheating the milk.

Biological and biochemical studies of milk: Pasteurization, C. J. Koning (*Pharm. Weekbl., 46 (1909), Nos. 49, pp. 1362–1371; 50, pp. 1388–1404; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 4, pp. 222, 223*).—A report of experiments in pasteurizing milk at different temperatures and under different conditions. The advantages and disadvantages of pasteurization are discussed.

Deviations in the fat content of milk, K. INDERMÜHLE (*Jahresber. Landw. Schule Rütti, 1909–10, pp. 91–107*).—The average percentage of fat in the milk of about 40 cows between the years 1902–1909 was as follows: Evening milk in winter 3.877 per cent, in summer 3.987 per cent; morning milk in winter 3.769 per cent, in summer 3.743 per cent. Averages are given for the consecutive months of the lactation period.

The determination of the number of body cells in milk by a direct method, S. C. PRESCOTT and R. S. BREED (*Jour. Infect. Diseases, 7 (1910), No. 5, pp. 632–640, fig. 1*).—This contains further details of a new method of counting the cells in milk by means of a microscope, which has been previously noted (E. S. R., 23, p. 80).

The passage of drugs into milk and of the food fat into the body fat, G. WESENBERG (*Molk. Ztg. Berlin, 20 (1910), No. 30, pp. 349–351*).—A review of the literature on this subject, accompanied by a bibliography.

Milk from the cattle market, C. J. KONING (*Separate from Nederland. Tijdschr. Melkhyg., 1910, No. 1, pp. 8; abs. in Milchw. Zentbl., 6 (1910), No. 10, pp. 473–477*).—Analyses are reported of the first milking from cows sold at public cattle markets.

Of milk from cows in the Rotterdam market the greatest variation which occurred in 5 samples was that of fat, which varied from 0.9 to 4 per cent. The range in some of the constants from the milk of 13 cows in the Hilverson market was as follows: Fat 0.05 to 5 per cent, solids-not-fat 7.4 to 10.3 per cent, lactose 3 to 5.3 per cent, protein 2.54 to 5.26 per cent, ash 0.73 to 1.07 per cent, acidity 4.4 to 9.2 per cent.

The work of the dairy division of the agricultural-chemical control station of the Saxony chamber of agriculture at Halle, W. NAUMANN (*Molk. Ztg. Berlin, 20 (1910), Nos. 40, pp. 472, 473; 41, p. 484*).—Analyses of milk, skim milk, cream, butter, and buttermilk are reported.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 576, pp. 2; 586–588, 590, 607, p. 1 each*).—These notices relate to the adulteration of milk and cream, and the misbranding of Neufchatel cheese.

Dried milk (*Mitt. Milchw. Ver. Allgäu, 21 (1910), No. 8; abs. in Milchw. Zentbl., 6 (1910), No. 10, p. 477*).—Analyses of dried milk products are reported as follows: Powdered cream, water 4.76, fat 41.28, protein 21.31, sugar 28.39, ash 4.26 per cent; powdered whole milk, water 6.23, fat 24.28, protein 24.27, sugar 39.18, ash 5.84 per cent; powdered skim milk, water 8.54, fat 1.31, protein 32.71, sugar 50.24, ash 7.2 per cent; partly skimmed milk powder, water 5.31, fat 6.63, protein 29.14, sugar 52.57, ash 6.35 per cent.

Biological and biochemical studies of buttermilk, C. J. KONING (*Pharm. Weekbl., 46 (1909), Nos. 26, pp. 658–669; 27, pp. 711–721; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 4, p. 222*).—The composition of buttermilk was found to be influenced by the composition of the milk, the nature of the ferment, the time of acidifying, the temperature, and other factors. The fat content is so low that it is difficult to tell whether a buttermilk is made from skim milk or is pure buttermilk. For the detection of water added while churning the index of refraction and the specific gravity are important. These values are lowered by heating, hence it is desirable to know whether or not the buttermilk has been made from pasteurized milk.

Results of butter control in the Baltic and northwest region of Russia, H. HAPPICH (*Balt. Wchnschr. Landw., 1910, No. 19; abs. in Milchw. Zentbl., 6 (1910), No. 10, pp. 478, 479*).—Physical and chemical constants are reported of samples of butter taken in March and April, 1910.

On the manufacture of Wilstermarsch cheese, O. LINDEMANN (*Molk. Ztg. Berlin, 20 (1910), No. 32, pp. 375, 376*).—Details are given for making this cheese, which is common in the markets in the vicinity of Hamburg and Mecklenburg.

Methods of paying for milk at cheese factories, S. M. BABCOCK, E. H. FARRINGTON, and E. B. HART (*Wisconsin Sta. Bul. 197, pp. 3–24, fig. 1*).—The work reported in this bulletin was undertaken to secure information on the cheese producing capacity of milk produced in various localities in the State, with special reference to (1) the variation in the casein content of milk of the same herd, (2) variation in the casein content of milk in different herds, (3) fluctuations in daily casein tests, (4) the relation of casein to fat in milk from a herd, and (5) the effect of fat on the quality of cheese.

In the test from the same herd, 35 out of 94 herds showed a variation in the casein content from one week to another of from 0.3 to 0.5 per cent, 7 herds showed from 0.6 to 0.8 per cent variation, while the remaining 52 herds showed less than 0.3 per cent variation.

"Between the different herd milks, variations were more noticeable. At Sheboygan Falls during July and August the tests ranged from 1.8 to 2.8 per cent; at Gotham and Twin Bluffs during August and September the range was from 2.1 to 3.1 per cent, and at Marshfield, during October, a range of from 2.4 to 3.6 per cent was found. The variations were about equal at the three places; the higher tests at Twin Bluffs, Gotham, and Marshfield were probably partly due to the later season and consequent decrease in milk flow. One might expect that the lower results were those secured in the first week of testing, while the higher ones represent those obtained in the later periods, in this way giving variations incident only to the advance in the lactation period. This, however, is not the case, as some of the higher and lower tests appear in both the first and last weeks of testing."

The daily fluctuations were gradual, amounting to as high as 0.7 per cent, and changed from one day to another, usually not exceeding 0.2 or 0.3 per cent.

"Although in a great many cases the ratio between fat and casein was quite constant, the exceptions and variations were so numerous as to make it plain that no fixed rule of general application could be used for the calculation of the casein content from the fat test. . . . Of 495 samples tested, 347, or 70 per cent, tested from 2.3 to 2.6 per cent casein, with fat tests varying from 3.2 to 4.7 per cent. The other 30 per cent tested from 1.8 to 3.6 per cent of casein with 2.8 to 6 per cent fat; 84 samples tested 2.3 per cent of casein, with a fat content of 3.2 to 4.3 per cent; 104 samples had 2.4 per cent casein with from 3.2 to 4.2 per cent fat; and 86 samples tested 2.6 per cent casein with 3.3 to 4.7 per cent fat. . . . With milk having the same fat test, the fluctuations in the casein tests were equally noticeable, the variations running as high as 1 per cent."

Cheeses were made from milks in which the fat content was the only variable factor. When these were judged by buyers for the market the results showed that the cheese was of slightly better quality when the milk contained a relatively high amount of fat. Other tests showed that under farm and factory conditions there is no indication that fat will be the controlling factor in the quality of cheese because of the nonuniform condition of the milk received.

The methods of paying for milk at cheese factories are discussed, and it is recommended that the payment be based on both fat and casein content. "An allowance of equal values for the pounds of fat and casein delivered by the patron is a simple and equitable method for distributing dividends." It is thought that the cost of operating the casein test is insignificant when compared with the advantages to be obtained by its use. Though dirty milk may injure the quality of the cheese, the view is expressed that there is no method of scoring the purity of milks close enough for grading the quality of cheese.

VETERINARY MEDICINE.

Compendium of applied bacteriology for veterinarians, F. GLAGE (*Kompendium der Angewandten Bakteriologie für Tierärzte. Berlin, 1910, pp. VII+272, figs. 60*).—This brief work has been prepared especially for the practicing veterinarian and the meat and food inspector. The photomicrographic plates in the book are a notable feature.

State live-stock sanitary officers (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 164, pp. 4*).—The state and territorial live-stock sanitary officers are listed.

On the occurrence of prussic acid in sorghum and maize, F. J. ALWAY and R. S. TRUMBULL (*Nebraska Sta. Rpt. 1909, pp. 35, 36*).—In a quantitative study of the prussic acid in sorghum carried on during 1907 Brünnich's findings (E. S. R., 15, p. 355), as to its presence were confirmed. In 3 samples of sorghum taken from the same field, a dark green lot in which the stalks averaged 50 cm. in length was found to contain 0.01215 per cent of prussic acid; a yellowish green lot, averaging 35 cm. in length, contained 0.00499 per cent; and a third, or yellow lot, averaging 22 cm. in length, contained 0.00405 per cent.

During the same summer samples of corn plants from both fertile and impoverished fields were tested at frequent intervals from the time they were 4 in. high until they formed ears but in no case was even a trace of prussic acid found. In February, 1907, all the suckers were collected from the cornstalks on an acre of a field in which several cattle had just died. A part of these suckers were subjected to a thorough test for prussic acid, but with negative results. The remainder were fed to calves and these showed no ill effects.

Another contribution in regard to the use of the body temperature for diagnosing anthrax in living animals, K. GLÖSER (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 31, pp. 611, 612*).—The author relates his experiences with several cases in which the temperature was utilized as a diagnostic aid for anthrax in cows.

Diagnosis of glanders by the precipitin reaction, D. KONEW (*Charkoff. Med. Jour., 9 (1910), No. 2, p. 138; Centbl. Bakt. [etc.], 1. Abt., Orig., 55 (1910), No. 3, pp. 251–253; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 47 (1901), No. 5, pp. 138, 139*).—The author laments the few instances in which the precipitin reaction has been utilized for diagnosing glanders, and recommends a method (mallease test) which consists of making the precipitant from a 24-hour agar culture of the glanders bacillus dissolved in 10 cc. of a 3 per cent antiformin solution (24 hours at 37° C.), and subsequently neutralizing with a 5 per cent sulphuric acid solution. A contact test is made with this reagent between the precipitinogen reagent and the serum from the suspected animal. The results obtained were generally good.

Tetanus in bovines, P. WÖLFFER (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 31, p. 612*).—A description of 2 cases of tetanus in cows, one of which had calved 10 days previous to the attack.

Is Koch's bacillus the cause of cancer? T. G. MCCONKEY (*Med. Rec. [N. Y.], 78 (1910), No. 8, pp. 319–322; abs. in Jour. Amer. Med. Assoc., 55 (1910), No. 10, p. 884*).—The opinion that the tubercle bacillus is the causative agent of cancer is expressed by the author.

Tests in regard to the migration of bacteria through the intestinal wall, with particular reference to the tubercle bacillus, A. DRALLE (*Versuche über die Durchlässigkeit der Darmwand für Bakterien. Inaug. Diss., Univ. Bern, 1909, pp. 28*).—In tests with pigeons, pigs, sheep, goats, rabbits, and guinea pigs it was found that when the injections were made per rectum no upward migration took place. In those cases when an infection took place after the injection per rectum, as in erysipelas, tuberculosis, and anthrax, it was enterogenous. Two cases of tuberculosis showed an infection in the pharyngeal and bronchial lymphatic glands.

A simple reaction for tuberculosis, P. BERMBACH (*Ztschr. Tuberkulose, 16 (1910), No. 3, p. 209*).—This test is based on the fact that lecithin when added to an emulsion of horse leucocytes is hemolytic, and further that the blood serum of noncachectic and nonfebrile cases of tuberculosis contains lipoid-like substances.

Tuberculosis, A. T. PETERS (*Nebraska Sta. Rpt. 1909, pp. 42–52*).—The author states that 281 farms reported by the Bureau of Animal Industry as sending tuberculous stock to the Omaha market were located in 55 counties, 47 of these being reported for swine tuberculosis, 41 for tuberculosis in cattle, and 33 for both cattle and hogs. It is pointed out that tuberculosis, both among cattle and swine, is confined largely to one center in the State.

In dealing with the disease, much has been accomplished through the medium of a reading club composed largely of farmers and stockmen throughout the State. A sample of the questions sent to members of this club, with answers, is appended to the account.

Of 3,602 head of cattle from 63 herds that were tested with tuberculin, 3.68 per cent reacted. The practice of breeders in allowing their hogs to follow cattle is considered by the author to be responsible for a large percentage of the disease in hogs. Sixty-six of the 281 farms reported are said to have cleaned up their herds, either by using the tuberculin test, or by sending their animals to the abattoirs subject to inspection.

A mixed infection of coccidiosis and pseudotuberculosis in cattle, G. BUGGE and H. SACH (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 33, pp. 649, 650*).—A description of a case in a milch cow, which later came to slaughter and autopsy.

Abortion in cattle, A. T. PETERS (*Nebraska Sta. Rpt. 1909, pp. 37–41*).—Mention is made of accidental abortion and a brief account given of the symptoms, cause, treatment, etc., for contagious abortion.

The author's investigations show that medicinal treatment has little or no effect on sterility resulting from contagious abortion. "Out of 209 animals that were apparently sterile, 86 remained sterile in the herd for a year or more, 41 for 18 months or more, while conception occurred in 11 which successfully gave birth to a calf. Post-mortems were held on 74 of these animals and all were found to have diseased ovaries, 42 out of the 74 having one ovary affected while 32 had both ovaries affected."

Observations on the blood pressure of sheep, M. DRESBACH (*Amer. Jour. Physiol., 25 (1910), No. 7, pp. 433–438; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 12–13, p. 596*).—The average blood pressure in the carotid artery of the sheep was found to be equivalent to 110 mm. of mercury.

History of hog cholera experiments in Nebraska, A. T. PETERS (*Nebraska Sta. Rpt. 1909, pp. 111–124*).—The author reports briefly upon hog cholera investigations conducted at the Nebraska Station since those reported in 1898 (E. S. R., 9, p. 93). He does not consider the swine plague bacillus to be in any way serious in the production of disease in swine; while it can be found in most animals affected with hog cholera, it may be compared to colon bacilli which are almost always found in cases of typhoid and yet do not produce typhoid fever.

Hogs which had recovered from hog cholera and were placed in a hog cholera pen and there exposed in various ways were found to be immune against the disease, as were also their litters. It is stated that several of a lot of sows (not immune through natural cholera) which were vaccinated with 20 cc. of horse cholera serum and 2 cc. of virus and then several weeks before farrowing fed or injected subcutaneously with hog cholera virus died from the disease. In experiments with a number of litters from sows recovered from hog cholera or previously vaccinated and infected 3 weeks before farrowing it was found that after 5 months the litters were not immune to the disease. The details of experiments conducted to test the length of immunity of hogs naturally infected are reported in tabular form but no conclusions are drawn.

Studies on hog cholera and preventive treatment, W. E. KING and R. H. WILSON (*Kansas Sta. Bul. 171, pp. 139–195, figs. 8, dgms. 32*).—This bulletin reports the results obtained from investigations conducted since the report of preliminary experiments, previously noted (E. S. R., 20, p. 881), was prepared.

The results of field work conducted in 1908 with experimental horse serum-hog cholera vaccine have been summarized in part as follows: "Twenty-four-hour horse serum vaccine, as a rule, is lacking in infectious properties. It possesses some degree of protection, which, however, is not constant enough to prove of practical use. Six-hour horse serum vaccine, under certain conditions relative to character of diet and individual variation in susceptibility, produces virulent hog cholera. It possesses greater protective properties than does 24-hour horse serum vaccine, and under certain conditions in the field it may save from 80 to 100 per cent of the treated animals. For practical field conditions, however, 6-hour horse serum vaccine is not safe."

In experiments conducted and reported in detail, it was found that "horse serum virus ($\frac{1}{2}$-hour horse serum) does not represent a mere dilution of the given hog cholera virus. A residence of hog cholera virus for a half hour in the circulatory system of the horse appears to activate the virus. Half-hour horse serum virus is capable of producing typical acute hog cholera when injected subcutaneously, in relatively small doses (4 cc.), into healthy hogs. The minimal fatal dose of highly virulent hog cholera serum may perhaps be found at some point between $\frac{1}{215}$ and $\frac{1}{300}$ cc."

The results of preliminary experiments relative to the attempted hyperimmunization of horse serum virus here reported lead the author to conclude that "horse serum and defibrinated horse blood may be injected into hogs in relatively large quantities, subcutaneously, intraperitoneally, and perhaps intravenously, without danger of loss from hypersusceptibility to the foreign blood. Half-hour horse serum virus, when injected into immune hogs according to the general technique employed in the original Dorset-Niles method, causes the production of protective substances in the blood of the treated animals. The degree of potency of the hyperimmune serum, prepared by the experimental, modified method, may depend upon the amount of horse serum virus used and the method of application."

In observations relative to the influence exerted by hog cholera virus injected intravenously upon the histological structure of normal horse blood, it was found that the following changes took place after a period of $1\frac{1}{2}$ hours: "A decrease of approximately one and one-half million erythrocytes; marked leucocytosis, there being an increase of over 4,000 leucocytes; a loss of approximately 4 per cent of the hemoglobin; and a decrease in the specific gravity and slight decrease in the time of coagulation."

In a comparative study made of the blood of 43 normal swine and 22 suffering from hog cholera, several changes in the case of hog cholera blood were found. "The number of erythrocytes and the hemoglobin content were decreased, the anemic condition increasing according to the progress of the disease. Frequently poikilocytosis was observed in the blood from severe cases of the disease. Leucopenia was shown in the blood of the diseased hogs, there being an average decrease of nearly 5,000 leucocytes per cubic millimeter. This depletion in leucocytes, as shown by the average differential counts, involved the decrease of 4 per cent of lymphocytes, 4 per cent of the polynuclears and 0.1 per cent of the eosinophiles. The blood from diseased hogs contained an average increase of 4.8 per cent large mononuclears, 2.8 per cent mast cells and 0.8 per cent transitional forms. The specific gravity was slightly lowered and the time of coagulation increased one minute. These results suggest that the changes in the structure of the blood of hogs suffering from hog cholera are analogous to those in cases of typhoid fever in man."

About hog cholera, J. Pekař (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 31, pp. 610, 611*).—The author gives his experiences in regard to this disease, and shows that it can occur in establishments which are kept in first-rate order and where the disease has never occurred before. Attention is also called to the relation which uterine infection and the offspring have to the disease. Where an endometritis exists, the author recommends lavaging with a 10 to 15 per cent solution of alcohol or a ½ per cent solution of creolin.

Krafft's vaccine.—A reply, Krafft (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 31, p. 612*).—A polemical article in regard to the efficiency of the author's serum, in which the reasons why von Sande did not have success with it (E. S. R., 24, p. 86) are stated.

The pathological anatomy of colic in the horse, F. Pilwat (*Arch. Wiss. u. Prakt. Tierheilk., 36 (1910), Sup., pp. 436–560, figs. 3*).—This work gives the result of observations with material which have come to autopsy at the pathological institute of the Tierärztlichen Hochschule at Berlin during the last 3 years.

Poultry diseases, G. B. Morse (*Quart. Rpt. W. Va. Bd. Agr., 1910, No. 19, pp. 808–850, figs. 6*).—This is an illustrated lecture on poultry diseases, delivered before the West Virginia Poultry Association at Huntington, W. Va. The diseases discussed are roup, thrush, pip, chicken pox, and various disorders of the intestinal tract, such as pasting, protozoan enteritis, flagellate diarrhea, coccidial diarrhea, bacterial enteritis, mycotic enteritis, and intestinal worms. Other diseases considered are gapes, bronchitis, aspergillosis (pneumomycosis in fowls and chicks), spotted disease of the liver (from tuberculosis, coccidiosis, cercomoniasis, aspergillosis, pyemia, sarcomatosis, carcinomatosis, visceral gout, or nodular fatty hepatitis), scaly legs, body mange or scab, and white comb or favus. Particular stress is put on the etiology, hygienic and preventive measures, and treatment of the conditions as they arise.

The influence of alcohol on the treatment of spirochetosis with atoxyl in fowls, Uhlenhuth and Manteufel (*Arch. Wiss. u. Prakt. Tierheilk., 36 (1910), Sup., pp. 664–669*).—Alcohol was found to have no influence on lowering the resistance of fowls to infection with spirochæta, nor had it any effect on the action of atoxyl upon these organisms. On the other hand, it was found that the simultaneous use of alcohol and atoxyl often makes atoxyl therapy itself lethal.

Blackhead in turkeys: A study in avian coccidiosis, L. J. Cole, P. B. Hadley, and W. F. Kirkpatrick (*Rhode Island Sta. Bul. 141, pp. 137–271, pls. 12; abs. in Bul. 141 [Abs. Ed.], pp. v–xiv, pl. 1*).—This is a detailed report upon avian coccidiosis, or blackhead, in turkeys based upon investigations conducted at the Rhode Island Station during a series of years in cooperation with this Department.

After a brief introduction, the authors give a historical résumé of the disease. In discussing its distribution and prevalance, it is shown to occur in Europe, Africa, Australia, and America, where its ravages have extended to Canada and nearly all the States. It attacks not only turkeys but also occurs as a generalized coccidiosis among other domestic birds of all ages, being most destructive among the young. The symptoms are voluntary isolation, stupor, loss of appetite, drooping of the wings, and emaciation; recovery is infrequent.

A detailed account of the etiology of the disease is then entered into. "Certain of the 'bodies' [found] are identical with the *Amœba meleagridis* described by Smith as the cause of blackhead. In the majority of cases they are not amebas, but stages in the development of a coccidium. This organism is the cause of the majority of cases of so-called blackhead, although other organisms frequently produce somewhat similar pathological conditions." The characteristics of the coccidium are described. "The same coccidium in the cyst stage was found repeatedly in chicks, fowls, pigeons, ducks, geese, pheasants, guinea fowl, quail, grouse, sparrow, thrush, robin, junco, mice, and rats, and probably in rabbits. In many of the birds mentioned above, and in the rabbit, a characteristic coccidiosis was frequently observed. This was especially true of young brooder chicks, in which the coccidium is one factor in the disease commonly called 'white diarrhea.' In this disease and in some other varieties of coccidiosis, it is important to observe that coccidiosis may be highly active without the presence of the encysted stage.

"The infective cycle is probably, in most cases, initiated as the result of the ingestion of a certain number of cysts. These, probably acted upon by the digestive fluids of the small intestine (pancreatic secretion), liberate the sporozoites, which at once enter epithelial cells. The sporozoites develop into schizonts, which liberate the merozoites, and these, in turn, develop into other schizonts. This schizogenous cycle is maintained for a certain time before the merozoites, instead of forming more schizonts, develop into the sexual products (macrogametes and microgametes). The sexual elements unite and the product (oöcyte) develops into the permanent cyst. During these cycles of development, many epithelial and connective-tissue cells are broken down, and this disintregation results in the characteristic pathological changes mentioned above.

"Experiments in transmission showed that blackhead could be transmitted by feeding from poult to poult, from poult to chick, and from chick to poult. In all these cases permanent cysts were present in the material which was used for feeding. It is not known whether the disease can be transmitted by other stages in the development of the coccidium. Experiments in transmission indicate further: (1) That blackhead may be transmitted by association and, in all probability, through the egg; (2) that bird lice and earthworms probably play no part in transmission."

"Although experimental work on the prevention and treatment of blackhead has advanced but little, a few preventive measures are recommended;" these include the protection of yards in which uninfected flocks are kept, the isolation of turkeys from other domestic fowls, the immediate isolation of birds which give evidence of the disease, the protection from English sparrows, rats, etc., which may carry the causative agent, a gradual increase of rations when fattening, and prompt incineration or burial of fowls dead from the affection.

A bibliography of literature relating to the subject is appended.

The gospel of cleanliness for poultrymen, G. B. Morse (*Rel. Poultry Jour., 17 (1910), No. 8, pp. 756, 757, 775–777, figs. 7*).—An address delivered before the American Poultry Association at St. Louis, August 18, 1910.

The chief points worthy of note are the author's maxims, which are as follows: "(1) Clean out the birds by means of Epsom salts, administered in an evening mash, estimating one-third of a teaspoonful to each adult bird. (2) Clean up by spreading powdered slaked lime over runs, dropping-boards, and floors of houses. (3) Clean water supply, to be obtained by adding permanganate of potash, enough to give it a claret red color. (4) Clean food, secured by application of heat, if perchance contamination has occurred. (5) Clean eggs by dipping them in 90 per cent alcohol just prior to incubation. (6) Clean incubators and brooders by thorough scrubbing with boiling water and good old-fashioned kitchen soap. (7) Clean breeding—breeding from the youngest stock consistent with the requirements of good breeding."

Bathing animals, H. LUCAS (*Arch. Wiss. u. Prakt. Tierheilk., 36 (1910), No. 3, pp. 305–355*).—Warm baths increase the sensibility of the skin, while cold baths decrease it. Total anesthesia of the skin sets in at from 13 to 15° C. Vasoconstriction and vasodilation in the skin appear much slower than in man. Cutis anserina could not be observed with animals. The frequency of the pulse is increased in both a cold and a warm bath of short duration; whereas cold baths with man lower the pulse frequency. Cold and warm baths increase the muscular action. The respiration is decreased in a cold bath but increased, contrary to the results with man, in a warm bath. Salt-water baths are also of therapeutic value for animals.

Our present day disinfectants and disinfection, R. LÜDERS (*Ztschr. Öffentl. Chem., 16 (1910), Nos. 4, pp. 62–69; 5, pp. 83–95*).—A general consideration of the methods of disinfection and disinfectants.

Bacteriological testing of certain disinfectants and the results as affected by varying conditions, C. T. KINGZETT and R. C. WOODCOCK (*Pharm. Jour. [London], 4. ser., 31 (1910), No. 2441, pp. 157–159, 169*).—"The authors deal for the most part with commercial disinfectants of the coal tar order, classifying them into 'emulsified disinfectants,' and 'homogeneous disinfectants.' The normal Rideal-Walker coefficients in respect of *Bacillus typhosus* were first determined, then the normal coefficients with regard to other germs, the influences of higher temperature as affecting the *B. typhosus* coefficient, and an extension of time, simply or coupled with a higher temperature. The results are tabulated for purposes of ready comparison, and they appear to show that while the Rideal-Walker test may very well serve to determine the relative germicidal values of similarly prepared preparations of a coal tar nature, it is not applicable for ascertaining the real or relative value of other disinfectants of a different chemical nature."

The bacteriological standardization of disinfectants, S. WOODHEAD and C. PONDER (*Pharm. Jour. [London], 4. ser., 31 (1910), No. 2441, pp. 155, 156, 169*).—"In this paper the authors fall back on a comparative valuation of disinfectants, taking phenol as their standard, and using modification of the Rideal-Walker drop method, as giving promise in theory of the most precise results. They deal with the following factors: Organisms to be acted upon; number of micro-organisms and amount of organic matter to be added; strength and number of dilutions; time during which the disinfectant is allowed to act; temperature."

Note on the Woodhead-Ponder method of testing disinfectants, R. T. HEWLETT (*Pharm. Jour. [London], 4. ser., 31 (1910), No. 2441, pp. 159, 169*).—"The author questioned the necessity of 'seeding' the sub-cultures with more than a standard loopful. He thinks that the use of *Bacillus coli* instead of *B. typhosus* is probably a desirable change, but further investigation is necessary."

RURAL ECONOMICS.

The agricultural labor problem, VON KAHLDEN (*Mitt. Ökonom. Gesell. Sachsen, 1909–10, pp. 37–70*).—This article discusses in detail the agricultural labor problem in Germany and points out the measures that have been taken and should still be put in operation with a view to its solution.

The author first presents statistics showing the decrease in the rural population and the causes which influenced it and the more than corresponding increase in the number of industrial workers which has taken place with the increase of population from the beginning of the nineteenth century to the present time. The labor problem is then discussed from three points of view, (1) agricultural labor as such, (2) the more agreeable and better paid labor in other lines of work, and (3) the movement of population to the cities. It is shown that, with the increased use of machinery in agriculture and the many privileges now afforded agricultural laborers which add to their income as measured in terms of money, the labor of workers in nonagricultural pursuits is neither more agreeable nor better paid than that of the farm; that the attractions of city life are the great cause which has depopulated rural districts; and that the movement to the cities can best be met by setting up counter attractions for improving and socializing conditions in rural districts.

Attention is also called to the increasing number of foreign agricultural laborers employed in Germany during harvesting seasons, and to its unfavorable effects on the economic and social welfare of the country. This is shown by the annual withdrawal of large sums of money paid in wages which are spent in foreign countries and by the great increase in contract breaking against which more stringent laws should be passed and enforced.

Among the suggestions made for improving agricultural labor conditions in Germany may be mentioned the organization of a labor bureau for placing workmen in those rural districts where there is the greatest demand for their services, the establishment of agricultural colonies, cooperative use of agricultural machinery, employment of improved implements, extension of piecework, increase of privileges to the laborers such as dwelling, land, and insurance, improving the social status of the farm hand, pensions for long service, granting a certain portion of the products, legal restrictions against the rural population crowding into the cities without means and without assurance of employment, and the establishment of a tariff sufficiently high to protect the farming industry. While recognizing the difficulties connected with these suggestions, the author is convinced that they form the basis for the solution of the agricultural labor problem in Germany.

The agricultural labor contract according to the rights of farm laborers and domestics, W. Asmis (*Landw. Jahrb., 39 (1910), No. 2, pp. 173–257*).—This article deals in detail with the agricultural labor problem in Germany from both the economic and legal points of view, the purpose being to determine how to increase the number of laborers and to counteract rural depopulation.

The general conclusion is reached that the improvement of the social standing of all classes of rural workers is the best means of keeping them on the land, and that land ownership is the most important means to this end. Better treatment of laborers and domestics in the homes of farmers and better facilities for acquiring land are urged for the solution of the agricultural labor problem in Germany.

An extensive bibliography is included.

The agricultural labor contract according to the rights of farm laborers and domestics, W. Asmis (*Deut. Landw. Presse, 37 (1910), Nos. 26, p. 290; 27, pp. 303, 304*).—This is a reprint of the author's conclusions to his article noted above.

Leeds unemployed and afforestation (*Country Life* [*London*], *28 (1910), No. 720, pp. 564, 565*).—This is an account of the progress made on the moor lands owned by the city of Leeds, England, in afforestation and in furnishing work to the unemployed.

From October, 1905, to and including nine months of the season of 1909–10, 703 acres had been planted with 2,523,000 trees of oak, beech, larch, Scotch fir, birch, sycamore, alder, Corsican pine, elm, ash, and poplar varieties, at a cost of about $48,000. This, in addition to a regular force of foresters, had furnished work to 600 of the city's unemployed men. The housing, standard of living, and wages of these men are briefly discussed, and it is pointed out that afforestation has improved both the health and the moral character of the laborers.

Opportunities for profitable farming in northern Wisconsin, E. J. Delwiche (*Wisconsin Sta. Bul. 196, pp. 3–34, figs. 26*).—This bulletin contains advice and information for prospective settlers. Soils and climatic conditions of northern Wisconsin are stated and the opportunities for the production in that region of clover, small grains, corn, fruit and vegetables, and live stock are discussed. It is stated that this section still contains about 10,000,000 acres of good unimproved farm land.

Methods of renting farm lands in Wisconsin, H. C. Taylor (*Wisconsin Sta. Bul. 198, pp. 3–30, figs. 2*).—This bulletin summarizes the experiences of a large number of farmers as to the different methods of renting farms in Wisconsin, and discusses the essential elements of a good contract or lease between landlord and tenant, the reasons for preferring cash or share tenancy, some special features of cash leases, and the methods of letting land on shares on grain and stock farms and in tobacco production.

In regard to the parties to farm tenancy, attention is called to the desirability of tenants being honest, efficient, and in possession of the requisite amount of capital for effective farming and of the landlord being "a fair-minded man, capable of giving good advice, but not overfree with his suggestions nor overinsistent upon his own notions being followed in detail."

Grain movement in the Great Lakes region, F. Andrews (*U. S. Dept. Agr., Bur. Statis. Bul. 81, pp. 82*).—The purpose of this bulletin is to present in statistical form and to discuss the extent of grain shipments from the States which contribute to the traffic in grain crops of the Great Lakes. Statistics of acreage, yields, and domestic and foreign shipments of grain in the 10 principal States which contribute to this industry are given for the years 1871–1909, and this system of inland waterways is shown to have afforded transportation facilities which have done much toward giving better and cheaper service in the marketing of grain crops.

Information is also given on freight rates, service and capacity of boats and cars, routes of grain traffic, methods of marketing, and the handling of grain in transit.

Exports of farm and forest products, 1907–1909 (*U. S. Dept. Agr., Bur. Statis. Bul. 83, pp. 100*).—Detailed statistics of exports of farm and forest products, including the countries to which consigned, are reported. In 1909 the value of farm products exported was $903,238,122, and of forest products $72,442,454, decreases from the preceding year (E. S. R., 22, p. 692).

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 12 (1910), No. 11, pp. 81–88*).—Statistics on the condition and acreage of crops in the United States and foreign countries, and the farm values and range of prices of agricultural products, monthly receipts and stocks of eggs and poultry in the chief markets, and causes of crop damages in 1909 in the United States are presented and discussed.

International Institute of Agriculture: Further information on the same, D. Lubin (*Rome, 1910, pp. 16*).—This pamphlet gives information on the work of the institute and its present status, together with the correspondence of adhering governments with reference to making their crop-reporting systems conform to the plan proposed by the institute.

AGRICULTURAL EDUCATION.

Consolidated rural schools and organization of a county system, G. W. KNORR (*U. S. Dept. Agr., Office Expt. Stas. Bul. 232, pp. 99, figs. 31*).—This bulletin is the product of 3 years' investigation of the actual workings of school consolidation plans in various parts of the United States. Attention is given to the various types of consolidated schools and their cost of maintenance, educational efficiency, and influence on rural social life. Plans are offered to illustrate the feasibility of consolidation under apparently adverse conditions. A list of tables showing the principal features of the investigation greatly increases the serviceableness of the bulletin to students of education.

As a result of his investigations the author believes that consolidated rural schools will eventually supplant the scattered one and two room rural schools over a large part of the United States. That the rate of progress in school consolidation during the first 20 years after its inception was characterized by slow growth is accounted for by the natural conservatism of school patrons, by the lack of a scientific system of school financing, and by lack of cooperation. These hindrances to progress are disappearing and at the rate that schools have been consolidated during the past 5 years "the next few decades should see a well coordinated rural school system nearing its completion."

The author finds that the numerous advantages of the consolidated as compared with the district school are secured through free conveyance of pupils, and are impossible of attainment except by that means. He states further that in communities where consolidation has had a fair trial, fully 95 per cent of the school patrons give it their indorsement and hearty support.

The advantages of the consolidated over the district school are apparent in financing, supervising, teaching, and attendance. The consolidated school articulates better with other schools, the money it expends yields larger results, better teachers are employed at larger salaries, the pupils make more rapid progress (gaining two-thirds of a year from the fourth to the eighth grade) and are better prepared for high school work, the attendance is larger and more regular, and opportunities are afforded for greatly enriching the course of study through the introduction of agriculture and home economics into the upper elementary grades and the high school.

Programme for technical schools and science and art schools and classes (*Dept. Agr. and Tech. Instr. Ireland* [*Circ.*], *1910, pp. 26*).—This is an explanatory circular, with the regulations for 1910–11, for the administration and distribution of grants to schools other than day secondary schools.

Ways in which the higher institutions may serve rural communities, A. D. WEEKS (*Ed. Rev., 40 (1910), No. 3, pp. 229–234*).—In this address before the North Dakota Educational Association the author maintains that "the two chief agencies of social control are education and legislation, closely interrelated," and points out that the higher institutions of learning are largely responsible for proper ideals of legislation. He would have these higher institutions collect reliable data regarding the civic and social needs of the country population, then study, analyze, and interpret them, "create attitudes with regard to them, and work up momentum for improved conditions." In his opinion "education in the industries of agriculture, stock raising, fruit culture, home making, and forms of manufacturing lies at the very basis of improved conditions," and much good may be expected from institutions teaching these subjects, not only through work in the class rooms but also through "extramural education."

Farmers' institutes for young people, J. HAMILTON and J. M. STEDMAN (*U. S. Dept. Agr., Office Expt. Stas. Circ. 99, pp. 40*).—This circular calls attention to the lack of adequate means for giving vocational training in agriculture to young people in the rural districts after they leave the public schools and before they enter upon their life occupations. As a partial remedy for this the authors recommend the organization of boys' and girls' clubs for children of public school age, and of farmers' institutes for young people for those who have left the public schools, the young people's institutes to become the connecting link between the agricultural club movement by the school and the regular farmers' institutes for adults.

A discussion of the method of instruction best adapted to giving vocational information, subjects for institute study, directions for contests, systematic course in contest work, prizes, boys' encampments, the form of organization and control of the institute, the season for meeting, the institute library, and farm clubs for boys and girls under institute control is followed by a report, by States and Territories, on young people's institutes organized under the auspices of the institute authorities or with their cooperation. An appendix includes a constitution for a county farmers' institute for young people, a course in contest and practice work, a form of constitution for boys' and girls' clubs, an order of topics for boys' and girls' institutes, corn and bread contest requirements, record cards for corn and bread, and score cards for seed-corn ears, seed wheat, seed oats, cotton, and bread judging.

MISCELLANEOUS.

Twenty-third Annual Report of Nebraska Station, 1909 (*Nebraska Sta. Rpt. 1909, pp. XXXII+139, figs. 12*).—This contains the organization list; a review of the work of the station during the year, including notes on field crops, abstracted on page 145 of this issue, and a discussion of the status of the new substations; a financial statement for the federal funds for the fiscal year ended June 30, 1909, for the state funds for the fiscal year ended November 30, 1909, and for the remaining funds for the fiscal year ended July 31, 1909; and special articles abstracted elsewhere in this issue.

Annual Report of Porto Rico Station, 1909 (*Porto Rico Sta. Rpt. 1909, pp. 43, pls. 3*).—This contains the organization list, a summary by the Special Agent in Charge of the investigations conducted at this station during the year, and separate reports by the physiologist, horticulturist, entomologist, chemist, coffee expert, plant pathologist, and assistant animal husbandman. The experimental work reported is abstracted elsewhere in this issue.

Monthly Bulletin of the Department Library, August and September, 1910 (*U. S. Dept. Agr., Library Mo. Bul., 1 (1910), Nos. 8, pp. 201–230; 9, pp. 233–257*).—These numbers contain data for August and September, 1910, respectively, as to the accessions to the Library of this Department and the additions to the list of periodicals currently received.

NOTES.

Georgia College.—J. W. Hart has been appointed professor of extension work in dairying in cooperation with the Dairy Division of this Department, with which he has been connected. The college will operate an educational train during February and March in cooperation with the railroads of the State. A federated agricultural association has been formed with the object of bringing together and unifying the efforts of all the agencies interested in the agricultural development of the State. The cotton school and other short courses have been largely attended.

H. W. Moore has been appointed tutor in animal husbandry.

Maine Station.—Dr. Frank M. Surface, associate biologist, has resigned to accept a position as research assistant in the department of animal husbandry at the Kentucky Station. He is to be succeeded by Dr. E. P. Humbert, of this Department. W. W. Bonns (Cornell, 1909) has been appointed associate horticulturist.

Minnesota University.—Dr. George Edgar Vincent, dean of the faculties of arts, literature, and science in the University of Chicago, has accepted the presidency of the university and will enter upon his duties April 1.

Nebraska University and Station.—George K. K. Link has been appointed adjunct professor of agricultural botany in the university and assistant botanist in the station, vice G. Herbert Coons, whose resignation has been previously noted, and has entered upon his duties.

New Jersey Station.—Dr. W. H. S. Demarest, president of Rutgers College, has been appointed acting director. William D. Hoyt, Ph. D., a graduate of the University of Georgia and graduate student and fellow at Johns Hopkins University, has been appointed assistant botanist and bacteriologist.

Ohio Station.—Among recent appointments are the following: Paul Thayer as assistant horticulturist, A. E. Perkins as assistant chemist in dairy investigations, and J. A. Stenius as assistant chemist.

Washington College.—Recent additions to the staff of the agricultural department include A. B. Nystrom, formerly of the Kansas College, as instructor in dairying; J. D. Charlton, formerly of the Manitoba Agricultural College, as instructor in farm mechanics; and Miss Lillian Blanchard as instructor in poultry production.

Farming demonstration trains over three railway lines in this State, and a farming demonstration boat on Puget Sound operated during the summer months, reached a total of 34,450 people.

Society for the Promotion of Agricultural Science.—This society held its thirty-first meeting in Washington, November 15, 1910. It was addressed by the Secretary of Agriculture, who spoke on the subject of Training Men for Agricultural Investigation. He showed how the Department is a training ground for such men, who are placed under specialists and given instruction and experience in special branches. He urged that more attention should be given to preparing men for instruction and investigation in agriculture. The address of the president, Prof. S. M. Tracy, dealt with The Relation of Color to Yield in Corn, summarizing the results with reference to this point of more than 13,000 records of experiments in 16 different States. These showed an average yield for the white varieties of 47.1 bushels per acre, and for the colored varieties of 45.6 bushels, a difference of 1.5 bushels per acre. A possible explanation of this was suggested.

Papers on The Influence of Type and of Age upon the Utilization of Feed by Cattle, and Results of Check Tests with the Respiration Calorimeter, were presented by Dr. H. P. Armsby; and The Influence of Maturity upon Yield and Digestibility of Timothy Hay was reported upon by President H. J. Waters. Dr. W. J. Beal described The Vitality of Seed Buried in Soil for Thirty Years, Dr. L. H. Pammel gave notes on New Fungus Diseases for Iowa, Prof. F. W. Rane presented a review of the work on The Gipsy and Brown-tail Moth Suppression in New England, and Prof. P. H. Rolfs discussed the Valuation of Carbohydrates in Commercial Feeding Stuffs. An interesting feature of the meeting was a symposium on The Essentials in the Training of the Investigator. This was participated in by Dr. A. C. True, Dr. H. P. Armsby, Dr. W. H. Jordan, Director C. E. Thorne, and Prof. W. J. Spillman.

The following officers were elected for the year: S. M. Tracy, president; E. W. Allen, secretary-treasurer; W. J. Beal, custodian; and W. D. Hurd, assistant custodian.

American Society of Agronomy.—This society met November 14 and 15, 1910, in Washington, D. C. In the absence of the president of the society, A. M. Ten Eyck, the first vice president, A. R. Whitson, acted as chairman. The program included the address of the retiring president and 20 papers, four of which were read by title.

Many of the papers described and discussed experimental methods and sought to lay as much stress upon the methods employed as upon the results secured. While some of them did not bear upon this question so directly, others went into the matter of reliable and trustworthy means of experimentation quite thoroughly, pointing out why certain methods do not furnish data for definite results and suggesting means for avoiding errors in drawing conclusions or in the determination of the final figures. Much attention was given to the standardization of experiments and two papers treating of this topic in particular were included in the program. This question was regarded as very important and a committee with C. V. Piper as chairman was appointed to consider the standardization of both soil and crop experiments and to report at the next meeting of the society.

By invitation, Bert Ball, secretary of the committee on seed improvement of the council of North American grain exchanges, laid before the society a plan to inaugurate a national movement to obtain a larger yield of better grain and requested the society to give its aid to the project. The essential feature of the plan is the perfection of an organization with the object of locating the supplies of grain suitable for seed on the one hand and for determining the local need of seed and the demand for it on the other. The discussion of this plan pointed out the difficulties in the way of the experiment station agronomists in undertaking much of this work. It was also mentioned that there is no uniformity of opinion with reference to the value of large and small, or light and heavy, kernels for seeding purposes, and that the results of experiments along this line have not as yet settled this question definitely.

The paper by E. G. Montgomery, entitled Method for Testing the Seed Value of Light and Heavy Kernels in Cereals, elicited considerable discussion, which finally led to the decision that the recommendations presented by the author be sent to all members of the society, with a view to inducing other investigators to undertake carefully planned experiments along this line for the purpose of getting comparable data which may form a reliable basis for definite conclusions as to the seed value of light and heavy kernels.

In addition to the consideration of this particular phase of field-crop work, papers were presented on methods of conducting cooperative experiments with farmers, the keeping of crop records, field and laboratory methods in wheat breeding, the analysis of yield in cereals, a method of preventing cross pollination of corn by means of muslin screens, methods of planting plats with the same ears of corn to secure greater uniformity in yield, and on the error in yields of wheat from plants and single rows in multiple series. A paper and the discussion on technical terms in agronomy led to the appointment of a committee on terminology, consisting of C. R. Ball, C. G. Hopkins, and J. F. Duggar. This committee was instructed to consider the terminology of agronomy, including the present use and the need for clearer definition of terms, together with the suggestion of suitable new terms, and to make a report at the next meeting.

Most of the remaining papers treated of some phase of soil work, such as ammonia formation as a measure of decomposition processes in the soil, soil management, soil granulation, long *v.* short periods of transpiration in plants as indicators of soil fertility, causes for increased yields of cereals by soil sterilization, and nonavailable moisture, its determination, and its relation to the moisture equivalent. The committee on classification of soils made a report of progress of its work, further report being deferred until the subcommittees, which are considering different viewpoints of soil classification, are ready to present results.

The committee on publication reported the publication in a cloth-bound volume of 238 pages of 39 of the 69 papers presented at the previous meetings. It was decided to distribute this publication free only to those holding membership for the years covered by the volume, and to leave the matter of price to new members and others in the hands of the committee on publication with power to act.

A committee on constitution was appointed and the following persons were elected officers of the society for the ensuing year: H. J. Wheeler, president; C. A. Zavitz, first vice president; R. W. Thatcher, second vice president; C. R. Ball, secretary; Lyman Carrier, treasurer; and L. J. Briggs and E. G. Montgomery, program committee.

Association of Official Agricultural Chemists.—The association held its twenty-seventh annual convention in Washington, D. C., on November 10–12, with an attendance of over 200.

The president of the association, W. A. Withers, delivered the annual address, entitled The Teaching of Chemistry in American Agricultural Colleges. It dealt primarily with the position occupied in the realm of science by the agricultural chemists of to-day, and was accompanied by a statistical study in regard to chemistry as taught in the agricultural colleges to students taking chemistry with the view to becoming chemists, and to those who intend to specialize in other agricultural lines. Drs. Wiley and Cameron, of this Department, in behalf of the section in agricultural chemistry of the International Congress of Applied Chemistry, discussed the importance to agricultural chemistry of the approaching congress and the need for presenting the results of American research work before it.

On invitation of the association, Secretary Wilson, of this Department, delivered an address in which special stress was laid upon the function of, and the benefits thus far derived by the people from, the pure food and drug law, and the direct and important relation which the agricultural chemists have toward the enforcement of this act.

The report of the associate referee on phosphoric acid, H. D. Haskins, dealt largely with the importance of providing state fertilizer control officials with some satisfactory method for handling the five or six different brands of basic slag now on the market. He considered the fineness and other methods now utilized by the association as unsatisfactory and faulty, and recommended the adoption of the Wagner method now employed in Germany. The referee on the determination of nitrogen, C. H. Jones, again called attention to the importance of determining the availability of nitrogen in fertilizers and crude materials, and the advisability of making this a point for future work.

E. L. Baker, referee on potash, reported on cooperative work with the official, the volumetric cobalti-nitrite, and the gravimetric cobalti-nitrite methods. This indicated that the majority of analysts obtained good results with the volumetric method, and that this method, with some slight modifications, will be a good, accurate optional one. He recommended a further study of the volumetric and gravimetric cobalti-nitrite methods for another year, and a study of the modified official method with some further modifications. The associate referee on potash availability, J. A. Bizzell, pointed out that with our present knowledge of soils an attempt to devise laboratory methods for available potash would be unjustified, and recommended a further investigation of the loss of water-soluble potash in potash salts when mixed with acid phosphate.

J. G. Lipman, referee on soils, reported cooperative work with the Drushel modification of the cobalti-nitrite method in connection with the J. L. Smith fusion method for total potassium in soils, and also on methods for determining soil acidity. The potash methods agreed very well amongst themselves, and the referee indicated that the cobalti-nitrite method should be an acceptable optional one. The results of the acidity tests were very variable and contradictory, and their continuation was recommended. O. M. Shedd introduced a recommendation that the referee on soils for 1911 be instructed to investigate a more exact method for humus estimation, and that certain changes be made in the text of Bulletin 107 of the Bureau of Chemistry, revised. C. G. Hopkins called attention to the fact that it is desirable to report the total amount of various constituents in soils and fertilizers in connection with the so-called available or acid-soluble constituents in order to be able to supply data upon which to base a just estimate of the material and its usefulness.

C. C. McDonnell, referee on insecticides, reported on the cooperative work with methods for lead arsenate, London purple, and potassium cyanid. The results obtained were generally good. The referee on water, J. K. Haywood, reported on the cooperative work of 8 collaborators, on the basis of which he recommended a continuation of work with the same methods for next year.

As chairman of the committee on the unification of terms for reporting analytical results in soils, fertilizers, and ash, R. J. Davidson stated that the committee had decided to bring the subject to the attention of the International Congress of Applied Chemistry, with a view to securing international agreement. The suggestions of the committee were toward the ultimate adoption of the element system, but it was advised that no State discontinue the use of the terms now in use until such discontinuation is also approved by the association.

The chairman of the committee on the testing of chemical reagents drew particular attention to the indefinite designations often found on labels as to the quality of reagents. L. M. Tolman, chairman of the committee on the unification of alcohol tables, pointed out that a fundamental question would have to be decided in regard to whether or not 60° F. is to be used as the standard temperature for these tables. He suggested that the tables of the United States Bureau of Standards be provisionally adopted. Chairman Tolman also made a few remarks on uniform methods for fat and oil analysis, and pointed out the work done by various scientific organizations in this regard.

L. L. Van Slyke, chairman of the committee on amendments to the constitution, made certain recommendations which were adopted.

As usual much attention was given to the subjects of food and drug analysis. Following a progress report from W. Frear, chairman of the committee on food standards, the associate referee on colors, W. E. Mathewson, reported on cooperative work with the identification of colors of known origin and a method for oil-soluble colors. The referee on fruit and fruit products, C. P. Moat, made a brief report on the determination of moisture in food products. R. W. Balcom, associate referee on vinegar, gave a progress report and spoke in regard to the question of clarifying before proceeding with the estimation of reducing sugars and the presence of an aldehyde in cider vinegar which reduced Fehling's solution, and, further, of the relation of the alkalinity of the ash to the amount of ash present. A general discussion of the subject of vinegar followed this report. A paper on the estimation of glycerin, etc., was read by B. B. Ross.

The associate referee on flavoring extracts, E. M. Chace, reported on the cooperative work on testing the accuracy of the Kleber, Bennett, fuchsin-sulphite, and Hiltner methods for citral in lemon and orange oils. The Kleber method gave the best results and apparently the Bennett method, the figures of which were in close agreement with it, will with some modifications be a good optional one. Recommendations were made for methods for estimating vanillin, coumarin, and acetanilid, and for estimating and identifying vanillin and coumarin, caramel, and citral in flavoring extracts. A paper on ginger extract by J. P. Street and C. B. Morrison was read, and one on A Quick Method for Determining the Ether Extract in Dried Powdered Substances, such as Cocoa, Coffee, and Spices, by A. E. Leach and R. S. Hiltner. A. F. Seeker, as associate referee on spices, reported on paprika, with particular reference to the identification of added oil and the reliability of the iodin number for detecting this oil, and recommended a further study of the chemical characteristics of the paprika extract. The associate referee on baking powder, E. Clark, discussed a few personal observations made on the presence of injurious and poisonous substances in baking powders. T. J. Bryan, as associate referee on fats and oils, reported highly satisfactory cooperative results on the determination of palm oil in the presence of vegetable oils by the Eisenschiml and Copthorne method. The associate referee on cocoa and cocoa products, W. L. Dubois, recommended on the basis of cooperative work that the provisional methods for determining sucrose and lactose in milk chocolate be adopted, and that the methods for fat be studied further. The associate referee on coffee and tea, M. E. Jaffa, indicated that the present provisional method for caffein does not yield all the caffein on the first extraction with chloroform. The modifications recommended last year were tried out and it was found that the gravimetric determination could not be taken as final because a great many impurities are extracted with the caffein.

P. B. Dunbar, the associate referee on preservatives, reported the cooperative work on the estimation of sodium benzoate in jams and codfish and on the estimation of total sulphurous acid. Following this, a paper entitled The Effect of Nitrates and Nitrites on the Tumeric Test for Boric Acid, by J. M. Price and E. H. Ingersoll, was read, in which it was indicated that nitrites and not nitrates were the interfering agents, nitrites being produced on evaporating the nitrate in a hydrochloric acid solution. Analytical results obtained with canned peas and catsup and well-known methods for the purpose of securing data for correctly judging these products were reported by the associate referee on vegetables, J. P. Street. P. F. Trowbridge, as associate referee on water and foods, discussed the advantages of the partial vacuum method over the other methods and the technique utilized in applying it to samples of ice cream, corn meal, etc. He also pointed out that where the drying was done with this method the results for fat agreed very well.

For the referee on inorganic and organic phosphorus in foods (meats), H. S. Grindley and E. L. Ross reported work at the Illinois Station with the Forbes magnesia mixture method, the Emmett-Grindley method, and the Siegfried-Singewald method, in which it was indicated that all methods, when proper precautions are used, will give identical results. R. Harcourt, as associate referee on vegetable proteins, reported on the separation of the salt-soluble and alcohol-soluble proteins in flour, and on the results of baking tests. The methods employed for the analyses were found to be very good, but the results obtained did not seem to show why one flour was superior to the other. In the report of C. L. Moulton, referee on the separation of nitrogenous bodies (meat proteins), a study of the hydrolytic cleavage products of the nitrogenous bodies of beef extract was recommended in order to determine which of these bodies resisted the Kjeldahl digestion when a large sample of extract was used and, further, to determine the best conditions for complete digestions by the Kjeldahl method. G. E. Patrick, as referee on the nitrogenous bodies in milk and cheese, presented an informal report and made several recommendations for future work. The referee on foods and feeding stuffs, G. M. MacNider, presented a report on cooperative work on the determination of the acidity of feeds, the results showing a fair agreement. No definite relation was found to exist between the amount of protein present and the acidity. The report on sugar and molasses submitted by Referee H. P. Agee and Associate Referee R. S. Hiltner was confined chiefly to moisture methods and the effect of different agents for clarification upon direct and Clerget's polarizations. C. S. Hudson in this connection called attention to the use of invertase for inverting instead of acid in the Clerget method when working with plants. The referee on tannin, J. S. Rogers, reported on cooperative tests with leather and tanning materials for moisture, fat, and water-soluble substances (soluble solids and nontannins). The report of L. F. Kebler, referee on medicinal plants and drugs, laid particular stress on existing methods of drug assay, methods for the analysis of soft drinks and patent medicines, and the existing physical standards of the United States Pharmacopœia.

Other papers were read at the meeting as follows: The Occurrence and Estimation of Tin in Food Products, by B. H. Smith and G. M. Bartlett; Constants of the Ether Extract of the Cashew Nut, by B. H. Smith and E. Clark; Comparison of Petroleum Ether and Ethyl Ether for Determining Fat in Cotton Products, by G. M. MacNider; A Modification of a Method for Crude Fiber, by M. P. Sweeny; The Influence of Salts of the Alkalis upon the Optical Determination of Sucrose, by C. A. Browne and G. H. Hardin; The Color of Flour and a Method for the Determination of the Gasoline Color Value, by A. L. Winton; Platinum Laboratory Utensils, by P. H. Walker and F. W. Smith; Synthetic Products and a Report on Headache Powders, by W. O. Emery; The Determination of Lead in Lead Arsenate as Lead Chromate, by C. C. McDonnell and R. C. Roark; American Worm Seed Oil, by E. K. Nelson; The Quantitative Determination of Ketones in Essential Oils, by E. K. Nelson; Physical Standards of the Pharmacopœia, by H. H. Rusby; Determination of Morphine in Opium and Opium Preparations, by E. O. Eaton; Micro-chemical Tests for Alkaloids, by B. H. Howard and C. H. Stephenson; Methods for the Analysis of Medicated Soft Drinks, by H. C. Fuller; Beef, Iron and Wine, by E. A. Ruddiman; and the Wagner Method for the Determination of Soluble Phosphoric Acid in Basic Slag, by W. L. Whitehouse.

The officers elected for the coming year were, as president, F. W. Woll, of Madison, Wis.; vice president, H. J. Patterson, College Park, Md.; and secretary, H. W. Wiley, Washington, D. C. As additional members of the executive committee, H. C. Lythgoe, Boston, Mass., and P. H. Trowbridge, Columbia, Mo., were elected.

During the session the association was afforded the opportunity of inspecting the new laboratories of the Bureau of Chemistry and a modern milk plant in Maryland. Resolutions were adopted in memory of the late Albert E. Leach.

Convention of Southern Agricultural Workers.—At the twelfth annual convention of Southern States Association of Commissioners of Agriculture, held at Atlanta, Ga., November 21 and 22, a change in name to that of Southern Agricultural Workers was decided upon, with the view of broadening the scope of the organization and including in its membership representatives from agricultural colleges, experiment stations, farmers' institutes, and others actively engaged in agricultural work. The new officers are as follows: President, Dr. Tait Butler, Starkville, Miss.; vice presidents, W. A. Gresham, commissioner of agriculture in North Carolina, and Director W. R. Dodson, of the Louisiana stations; and secretary-treasurer, Director B. W. Kilgore, of the North Carolina State Station.

International Live Stock Exposition.—The eleventh exposition, held at Chicago, November 26 to December 3, continued the successes of former years. The agricultural colleges and experiment stations also fully maintained their position of leadership, figuring largely in the prize winnings and in the list of judges. Their entries were as usual very strong in the fat-stock classes. The Iowa College won the much-coveted grand championship for single steers with Shamrock II, an Angus calf weighing 1,100 pounds at 10 months of age, and the Kansas College first place for 2-year-olds. The intercollegiate student judging competition was keenly contested by teams from nine institutions, first place going to the University of Missouri.

Among the large number of agricultural organizations to hold meetings during the exposition were the American Society of Animal Nutrition, the National Association of Stallion Registration Boards, and the American Federation of Agricultural Students.

Ninth International Agricultural Congress.—The ninth International Agricultural Congress will be held at Madrid May 1–6, 1911, under the patronage of the King of Spain. It will be organized in eight sections, among the subjects to be discussed being the organization of cooperation and agricultural credit, afforestation, plant diseases, animal nutrition, and the application of manures. Either societies or individuals may participate in the congress, the subscription being 20 pesetas (about $4). Applications for admission must be filed prior to March 15 with the secretaries of the organizing committee of the congress at the offices of the Society of Spanish Agriculturists, 12 Campoamor, Madrid.

EXPERIMENT STATION RECORD.

Editor: E. W. ALLEN, Ph. D., *Assistant Director.*
Assistant Editor: H. L. Knight.

EDITORIAL DEPARTMENTS.

Agricultural Chemistry and Agrotechny—L. W. Fetzer, Ph. D., M. D.
Meteorology, Soils, and Fertilizers—W. H. Beal; B. W. Tillman.
Agricultural Botany, Bacteriology, Vegetable Pathology—W. H. Evans, Ph. D.; W. H. Long.
Field Crops—J. I. Schulte; J. O. Rankin.
Horticulture and Forestry—E. J. Glasson.
Foods and Human Nutrition—C. F. Langworthy, Ph. D.
Zootechny, Dairying, and Dairy Farming—E. W. Morse.
Economic Zoology and Entomology—W. A. Hooker.
Veterinary Medicine—W. A. Hooker; L. W. Fetzer.
Rural Engineering— ——— ———
Rural Economics—J. B. Morman.
Agricultural Education—D. J. Crosby.

CONTENTS OF VOL. XXIV, NO. 3.

SUBJECT LIST OF ABSTRACTS.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

AGRICULTURAL BOTANY.

FIELD CROPS.

HORTICULTURE.

FORESTRY.

RURAL ENGINEERING.

RURAL ECONOMICS.

AGRICULTURAL EDUCATION.

MISCELLANEOUS.

LIST OF EXPERIMENT STATION AND DEPARTMENT PUBLICATIONS REVIEWED.

NOTE.—The price of *Experiment Station Record* is $1 per volume, and two volumes are issued annually. It may be purchased from the Superintendent of Documents, Washington, D. C., to whom all remittances should be made. The publications of the state experiment stations are distributed from the stations and not from the Department.

EXPERIMENT STATION RECORD.

Vol. XXIV. March, 1911. No. 3.

Those who are familiar with agricultural development in this country under the stimulus of Federal legislation will find much of interest in plans which are now being formulated for the development of the economic resources of Great Britain through governmental aid. These plans are the result of a most comprehensive act of Parliament known as the Development and Road Improvement Funds Act, which although not restricted to agriculture seems likely to lead to far-reaching benefits to that industry.

Under the terms of the Development Act, as the measure is commonly known, there is provided a board of development commissioners, upon whose recommendations advances may be made by the Treasury for aiding and developing agriculture and rural industries, forestry, the reclamation and drainage of lands, the general improvement of rural transportation, the construction and improvement of harbors and inland navigation, the development and improvement of fisheries, "and for any other purpose calculated to promote the economic development of the United Kingdom." These advances may be either as grants or loans, and may be made to a Government department, such as the Board of Agriculture and Fisheries or the Board of Education, or to an educational or other public institution, or to an association of persons not trading for profit.

The funds available for the purpose consist primarily of what is known as the consolidated fund, for which the act appropriates the sum of $2,500,000 annually for five years, beginning with April 1, 1910. To this may be added any special appropriations which may be made subsequently, or any gifts or legacies which may be forthcoming. The fund is available until used, and any revenue derived from such sources as interest or profits in the repayment of loans or the sale of farm products may also be utilized.

The development commissioners mentioned above constitute the administrative body in charge of the fund, and are five in number, appointed by the King for terms of 10 years each, the tenure being so devised that the term of one member expires every two years. Two of the commissioners may receive salaries not to exceed $15,000 a year each, and the board as a whole has the power of appointing subordinate officers at such salaries as it sees fit, subject to the consent of the Treasury. It is authorized to appoint advisory committees in connection with the various projects taken up, and may also formulate schemes for new projects. The Board of Agriculture and Fisheries has no part in the administration of the act, and by the law may itself be an applicant for grants under it.

The scope of the work which may be undertaken with this act is very comprehensive. The term "agriculture and rural industries" as used in the act is subsequently defined as including agriculture, horticulture, dairying, the breeding of horses, cattle, and other live stock, the cultivation and preparation of flax, the cultivation and manufacture of tobacco, and any industries immediately connected with or subservient to any of these. The lines of development open are also enumerated, as the "promoting of scientific research, instruction, and experiments in the science, methods, and practice of agriculture (including the provision of farm institutes), the organization of cooperation, instruction in marketing produce, and the extension of the provision of small holdings; and by the adoption of any other means which appear calculated to develop agriculture and rural industries." Forestry work likewise may include experiments, the teaching of methods of afforestation, and the actual purchase and planting of land.

Road improvement is specifically dealt with in a separate section of the act. This provides for the appointment by the Treasury of a road board entirely distinct from the development commissioners. No funds are directly appropriated for road improvement in the Development Act, but provision is made for borrowing money from the consolidated fund or from any other available source, the sums borrowed to be repaid from the road improvement grant, obligation for interest and refund not to be incurred beyond \$1,000,000 for any one year. The revenue of this board for the present year has been stated at about \$1,500,000, with a prospect for a considerably larger amount next year.

This summary of the provisions of the act as a whole will make it evident that wide discretionary powers are vested in the development commissioners, and that the results attained will be largely influenced by their decisions as regards the lines of work to be entered upon and the way in which these are to be conducted. The commissioners have thus far devoted themselves largely to formulating carefully considered plans. As would be expected, keen interest has been manifested in the possibilities afforded by the act, and applications for aid under its provisions have been so numerous as to lead to a statement some months ago that the grants then asked for would involve an expenditure of three times the sum available.

Although the act became law December 3, 1909, only one project has been given formal approval. This has for its object the encouragement of light horse breeding, a matter of particular importance in Great Britain at present because of the requirements of the British army, now largely met by importations of foreign stock. A grant of $200,000 has been made for the ensuing year, which it is planned to utilize in the award of premiums to stallions, grants for the purchase of grade mares, the free nominations of mares for service by premium or approved stallions, the purchase of thoroughbred stallions, and the encouragement of voluntary stallion registration. The detailed expenditure of the funds is to be intrusted to an advisory committee representing the various interests most concerned.

The utilization of a portion of the fund for agricultural instruction and research has not yet been definitely provided for, but is understood to be receiving much consideration. The desirability of such aid seems to be generally conceded, particularly as at present the Treasury funds available for these purposes are comparatively restricted. As explained in detail in a previous discussion of the status of agricultural education in England and Wales,[a] grants to higher education in agriculture have been made for many years by the Board of Agriculture and Fisheries, which corresponds in a general way to the Federal Department of Agriculture in this country, but for 1909–10 these amounted to but $61,500, distributed among twenty institutions. In 1908–9 additional special grants for experimentation and research were begun, but these also have been small, ranging in 1909–10 from $125 to $1,000 each, and aggregating but $3,000.

The need for additional resources for these purposes has long been felt, and has been a frequent subject for discussion not only among agricultural workers, but also by scientific men in general. Last October the Board of Agriculture and Fisheries made application to the development commissioners for $200,000 annually for use in research work in agriculture and for giving technical advice to farmers. A number of agricultural colleges and similar institutions have submitted independent applications for financial aid, and the local county councils, which at present receive small grants from the Board of Education for elementary instruction in agriculture, have requested that $10,000 be set aside for the employment of county agricultural advisers.

There has also been presented to the Prime Minister for reference to the commissioners a report from the British Science Guild, dealing with the present position of agricultural research in the United Kingdom, together with a memorial signed by Members of Parliament, representatives of societies connected with agriculture, and per-

[a] E. S. R., 20, p. 201.

sons prominent in the scientific world. This memorial declares that "only by a liberal allotment of the funds now available can British farmers be placed in the positions enjoyed by their competitors in other lands, where the endowment of agricultural research has long been recognized to an extent to which there is no parallel in Great Britain as among the most urgent and legitimate objects for state aid."

The immediate investigation of the large questions raised by these applications has been intrusted to a subcommittee of the commissioners, consisting of Prof. A. D. Hall, of the Rothamsted Experiment Station, and Mr. Sydney Webb. This subcommittee is conferring with an advisory committee of fifteen, appointed by the Board of Agriculture and Fisheries, of which Secretary T. H. Middleton of the board is chairman, and it is expected that a comprehensive policy will be evolved.

One important result of the new legislation has been to stimulate widespread interest in the general subject of agricultural research. The Science Guild, as mentioned above, has given active attention to it and valuable discussions have been contributed from other sources as to the scope and the problems involved in the proper organization of the work. Many of these problems are analogous to those already encountered by Department and experiment station workers in this country, and have for them a peculiar significance, especially as the American experience has been much cited in connection with the new enterprise.

For example, questions as to the exact definition and characteristics of research, as distinguished from other forms of experiment and from the application of known facts and practice, the kind of work most needed under existing conditions, and the means of securing an adequately trained personnel, have been prominent topics of discussion. Another question upon which opinion has been expressed is as to the relative merits of a single centralized experiment or research station, as compared with a series of smaller local institutions with separate grants; and along with this, the amount and character of supervision of the various enterprises which is desirable. The plan of subsidizing existing colleges and other institutions to enable the carrying out of agricultural investigations appears not to meet with entire favor, and the regulation of such grants so as to secure their use in a productive way without commercializing research is pointed to as a difficulty. This difficulty is illustrated in a recent report of the Board of Agriculture and Fisheries of Great Britain, on Grants for Agricultural Education and Research. The report says:

"A public department when authorizing the expenditure of money on research is bound to take into consideration the probable value of the work to the state. It can not rest satisfied with the assurance that sooner or later all accessions to knowledge will benefit the country. The taxpayer of to-day naturally wishes to see a return for his contribution, if not in his own lifetime at least in that of his children. It is obvious therefore that, as a matter of elementary justice, the question of time must receive consideration from any department intrusted with the expenditure of state funds on research. This obligation may make it difficult to resist the demands of those who call for early results; but on the other hand these demands must be resisted if the state is to avoid squandering its resources. Nothing is more certain than that much of the best work, and the work which most deserves the aid of the state, is of a kind which can not be hurried, or than that no genuine scientific worker can grind out results to order. . . . As the claims of agriculture on the development fund are obviously greater than the claims of agriculturists, the first endeavor should be to find out and aid those scientific men who, whether agriculturists or not, are best qualified to give the industry the assistance which it needs."

The British Science Guild urges that "the value of investigation can rarely be translated directly into terms of pecuniary gain. The benefits lie more in the method of thought that is induced among the farmers and those concerned in advising them, in the stimulus it gives to a more exact conduct of the business of farming, in the confidence with which men take up the fresh resources which science and the industries are always putting at the disposal of agriculture, than in any sudden revolutions effected by research. The fact that the countries whose agriculture has made the greatest advances in recent years are those which pay the greatest attention to research is itself sufficient justification for the action of the British Science Guild in urging the British Government to move in this direction."

The secretary of the Board of Agriculture and Fisheries expresses the conviction that the research work in agriculture should be developed at local centers and largely in connection with educational institutions, where its influence on the teaching would at once be potent, and where the conditions are most favorable for it, a view which in general harmonizes with experience in this country. While he admits that from a purely administrative point of view a state research station would offer certain advantages, he argues that the local character of the studies to be made and the application of the results to local farming conditions are against the establishment of one central station. He says: "In the immediate future there is little doubt that the major portion of the funds available for agricultural research should go to a small number of institutions, qualified by staff and equipment to undertake research; but this does not settle the question of the system at which the state should aim."

The development of the plans for research under this new fund, as well as of many other enterprises which may be inaugurated under the provisions of the act, will be awaited with keen interest by all workers in agricultural science. They will be inclined to concur in the sentiment of British scientists, as expressed in a recent issue of *Nature:* "The occasion is a critical one for agricultural science. The amount of money is considerable and much will be expected in return for it; if those engaged in agricultural research can justify its expenditure they will be rendering good service not only to agriculture but to science in general."

The soil is made up of organic and inorganic or mineral constituents. Except in the case of peat soils and those of like nature the mineral constituents make up by far the greater proportion of the soil mass. Cameron found the average proportion of organic matter in surface soils (to a depth of 8 inches) of the United States to be 2.06 per cent and in subsoils 0.83 per cent, or 28 tons per acre to a depth of 8 inches and 50 tons to a depth of 2 feet.

Notwithstanding the relatively small percentage of organic matter in ordinary soils, the fertility and productiveness of the soil depends to such a large extent upon its organic constituents that no soil is considered normal without a certain proportion of organic matter. Although this fact is generally recognized, the organic constituents of the soil have not been so thoroughly studied as the inorganic or mineral constituents, and as a result exact knowledge of the nature and function of these constituents is very deficient. Schreiner says: "Every soil investigator, whether it be the chemist, bacteriologist, or physicist studying some special problem, or the agronomist dealing with the general relation of soils to crops, sooner or later encounters difficulties that have their origin in the lack of knowledge of the chemical composition of the organic matter of the soil."

A great deal has been written about the nature and importance of the organic matter of the soil, particularly the so-called humus, and many views have been held as to its relation to crop production, these views changing from time to time, but there has really been very little accurate, undisputed scientific data upon which to base these views. Throughout the century or more of controversy on the subject, however, humus has always been recognized as a most important factor in soil fertility. In fact, the older investigators of the subject were disposed to give an exaggerated importance to humus as a direct and essential element of plant food, measuring the fertility of the soil entirely by the amount of humus present. Until within recent years a modification of Mulder's view, that humus and the larger part of the organic matter of soils is made up of humus acids having the same general properties in different soils, was generally accepted.

More recent investigation, however, has shown that this view is untenable and that humus is a very complex substance made up of a large number of chemical compounds, not necessarily related, derived unchanged from plant or animal remains, or resulting from the breaking down of complex bodies in the plant or animal tissue, or from changes brought about by bacterial activity in the soil. The character of the organic matter of the soil is therefore determined by the nature of the materials added to the soil and the character of decomposition they have undergone.

It is obvious that there can be no clear understanding of the functions of the organic matter of soils without exact knowledge of its composition. Such knowledge is important from the standpoint of the farmer, but much more important from the standpoint of the scientific investigator. On this point Schreiner says: "There can be intelligent chemical treatment of any material only when the chemical nature of the material treated is known. The treatment to which soil organic matter is subjected under cultural methods is in part at least chemical treatment in that such methods induce chemical changes. The operations of irrigation, conserving of moisture by mulches, aeration by cultivation, inoculation with cultures of bacteria, addition of organic and green manures, are all common agricultural methods used by farmers and they are also operations that influence the chemical changes which soil organic matter undergoes."

The theory that humus is a more or less definite body, representing the valuable portion of the organic matter of the soil, has led to much futile effort on the part of chemists to devise methods of isolating this body from soils and studying its properties with relation to soil fertility. The rather limited results and possibilities of this line of inquiry from a scientific standpoint have been brought out by the work of a long list of investigators, as well as that of the Association of Official Agricultural Chemists, which, after a number of years of comparative tests of various proposed methods for determining humus, voted at its last meeting "that the referee on soils for 1911 be instructed to investigate the subject of a more accurate method for humus determination."

It is evident from an examination of the work referred to, as well as the various discussions of the subject which appear from time to time, that no one knows in a scientific sense what humus is, or is able to draw a clear line of distinction between humus and other organic matter in the soil. It is therefore of fundamental importance to investigate the organic matter of the soil as a whole and to isolate and study the origin and properties of all of the definite organic compounds which it contains.

Greater progress has very recently been made in this important direction than is perhaps generally realized. Within the past year Schreiner and Shorey and their associates of the Bureau of Soils have reported in Bulletin No. 74 the isolation and study of over twenty compounds found in the organic matter of the soil. These compounds belong to eight or more different classes, as paraffin hydrocarbons, acids, alcohols, esters, carbohydrates, hexone bases, pyrimidine derivatives, and purine bases.

While this work shows clearly the complex character of the organic matter of the soil, it also encourages the hope that the exact chemical nature of all of the organic constituents of the soil may ultimately be determined by modern methods of research, thus furnishing a safe basis for further study of the origin and properties of the compounds and their relation to soil fertility and productiveness, which has not heretofore been available. Such exact knowledge will prove of great assistance in the investigation of all soil problems in which the organic matter is the paramount factor.

Of like importance is the work of Jodidi and others, in which known methods of investigation of proteids are being applied in the study of the decomposition products of nitrogenous bodies in the soil. This work promises to show definitely the chemical character of the nitrogenous bodies present in the soil and the processes by which they are formed, thus furnishing an exact basis for studying the relation of these bodies to the nitrogen nutrition of plants, a point on which surprisingly little is actually known notwithstanding the fact that great significance has been usually and perhaps rightly attached to humus as a source of nitrogen for plants. The relation of humus to the availability of the mineral plant food of the soil, a subject not now well understood despite the fact that it has received much investigation, can only be fully cleared up when studied in the light of exact knowledge of the compounds involved.

Bacteriological investigation of the soil has brought out very clearly the fact that, aside from its recognized physical effects and function as a source of supply of nitrogen and perhaps other plant food, the organic matter of the soil is a most important factor in soil fertility as a source of food to the micro-organisms, which increase and elaborate food for higher plants. A knowledge of the exact composition of the organic compounds formed in the soil under different conditions will perhaps make it possible to control in a measure the character of the organic compounds produced and thus the bacterial activity of the soil.

Evidently no work on humus which does not take account of the very complex and varying character of the group embraced by this term can be expected to give intelligent or final results. Humus is a generic term, as "mineral matter" is. Considered as a substance, we are dealing with something whose character in a given case is quite unknown, and whose response to tests and reactions or whose effect on plant life can not be foreseen. It is only as these facts are recognized that real progress in this line of study can be looked for.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

The relation of agricultural chemistry to agriculture and biology, F. Scurti (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 3 (1909), pp. 309–337*).—A paper read at the Rome meeting of the Italian Chemical Society in February, 1910.

Yearly report on the progress in chemistry of foods and condiments, H. Kuttenkeuler (*Chem. Ztg., 34 (1910), Nos. 48, pp. 426–428; 49, pp. 437–440*).—A retrospect of the advances made in the chemistry of foods and related branches during 1909.

Innovations in analytical chemistry, C. Beger (*Ztschr. Analyt. Chem., 49 (1910), No. 7, pp. 427–436, figs. 4*).—The author describes and presents illustrations of handy innovations for preventing losses and other discrepancies in the process of estimating nitrogen in milk and feces, also a modified Kipp apparatus, and a description of the use of the Ostwald thermoregulator for artificial digestion tests.

The uses of trichlorethylene in analytical chemistry, L. Gowing-Scopes (*Analyst, 35 (1910), No. 411, pp. 238–245*).—A description of the chemical, physical, and solvent properties of trichlorethylene, specific gravity 1.47, boiling point 88° C. It is a colorless and noninflammable liquid. The article considers its use for fat extraction in milk and foodstuffs analysis, etc.

A comparison of Pozzi-Escot's and Devarda's method for the estimation of nitrates, E. Cahen (*Analyst, 35 (1910), No. 412, pp. 307, 308*).—In the Devarda method "the solution of the nitrate in water is introduced into a Jena glass bulb flask together with 2 to 3 gm. of the alloy (Al 45, Cu 50, Zn 5) and 5 cc. of alcohol. The alloy must be sufficiently finely powdered to pass through a 60 mm. sieve. Fifty cc. of concentrated alkali are added, and the flask quickly connected to the Kjeldahl distilling apparatus and allowed to stand for 30 minutes, when the vigorous reaction will be complete. The contents of the flask are then slowly raised to the boiling temperature, and steam is passed for 30 minutes, when all the ammonia will have distilled over into the receiver containing the acid." The indicator employed was methyl-red.

The method is considered superior to that of Pozzi-Escot (E. S. R., 22, p. 706).

Determination of ammonia nitrogen in water in the presence of hydrogen sulphid, E. Bartow and B. H. Harrison (*Jour. Amer. Chem. Soc., 32 (1910), No. 10, pp. 1256–1259*).—The authors find that by adding sulphuric acid to the water to be examined the ammonia is fixed, while the hydrogen sulphid may be distilled off. The ammonia is then liberated with sodium hydrate. This procedure has no influence on the other analytical results.

The principles involved in the preparation of soil solutions for chemical analysis, A. von 'Sigmond (*II. Conf. Agrogéol. Internat. Stockholm, 1910, Résumé [1], pp. 25–30*).—According to the author, the methods of preparing the soil solution constitute the nucleus of every soil analysis. He finds it imperative to consider (1) The recognition of the problem at hand in deciding on the methods for its solution; (2) the methods utilized for sampling the soil in the field; (3) the size of the soil particles in the sample to be examined; (4) the quality and quantity of the solvent employed; and (5) other factors which affect the solution, such as temperature, time of exposure to solvent, concentration, etc. The various points are further analyzed and discussed.

Preparation of the soil extract for chemical analysis, A. Vesterberg (*II. Conf. Agrogéol. Internat. Stockholm, 1910, Résumé [1], pp. 34, 35*).—The author points out that in order to judge the characteristics of the soil properly, particularly its content of plant nutrients and products of weathering, it is necessary to utilize a comparatively strong solvent. Other factors to be considered in this connection are the nature and amount of solvent, the temperature, and the time of exposure to the solvent.

The author recommends the following procedure for mineral soils: Extract 1 part of soil with 5 parts of a hydrochloric acid solution (six times normal) boil for a period of 1 hour, and determine in the resulting extract K_2O, P_2O_5 and $(Fe\ Al)_2O_3$. The amount of $(Fe\ Al)_2O_3$ found in the extract is a measure as to the amount of the weathering-silicates (zeolithic) contained in the soil. For the sake of completeness the author also recommends determining the soluble silicic acid present in the residue after extracting with hydrochloric acid solution. The calcium content can be calculated from the results of the carbon dioxid determination, or it can be extracted with a cold 2 per cent solution of acetic acid (or a warm ammonium chlorid solution) and the amount of calcium determined directly.

The electrical bridge for the determination of soluble salts in soils, R. O. E. Davis and H. Bryan (*U. S. Dept. Agr., Bur. Soils Bul. 61, pp. 36, pls. 5, figs. 7*).—This is a discussion of the principles of the slide wire bridge as used by the Bureau of Soils of this Department, with a detailed description of a modification of the apparatus, previously described (E. S. R., 11, p. 325; 12, p. 320). The bulletin also includes some experimental results obtained with the instrument, and which have particularly to do with determining the causes for certain differences in the results obtained with the method.

The conclusions from this work were as follows: "The resistance of a soil having the same salt content increases with an increase in the fineness of texture of the soil. Where the salt is partly carbonates the resistance is much greater than when other salts alone are present. The presence of organic matter increases the resistance for the same salt content. If a soil is dry, the reading for resistance should not be made until 20 minutes have elapsed after moistening. Accurate enough results may be obtained with concentrated solutions by reading resistances with the cup partly filled."

The authors point out that when considering these conclusions for field work it must be noted that the method only reaches its full accuracy when the alkalis contain very little or no carbonate and when the amount of organic matter is small. For eliminating the error caused by carbonates, the authors have constructed special tables giving ratios for various combinations of carbonates and other alkalis as determined in the area under investigation, though in areas where much variation exists the bridge results must be considered only as approximate. The method is not recommended for soils which contain much organic matter owing to the difficulty of preparing standards for such soils.

The bulletin also describes field directions for the use of the bridge.

Volumetric determination of copper, E. B. Holland (*Massachusetts Sta. Rpt. 1909, pt. 1, pp. 140, 141*).—This method is an adaptation of the Low zinc-acetate method and has been employed by the author for estimating the copper in the cuprous oxid obtained in the Allihn tubes in sugar estimations. Its chief advantage lies in the fact that a large number of these tubes can be collected and the copper determinations made at one time. It has also been successfully applied to the estimation of copper in Paris green and arsenite of copper. It is conducted as follows:

"The copper is dissolved in 5 cc. of concentrated nitric acid [the filter], thoroughly washed with hot water, and the filtrate run into an Erlenmeyer flask by means of suction. The solution is evaporated to small volume to expel excess of acid, and afterwards diluted with 60 cc. of water. Too great concentration should be avoided, as it often results in the precipitation of a very insoluble form of copper and the loss of the determination. Twenty-five cc. of a saturated solution of zinc acetate and 20 cc. of potassium iodid (165 gm. to 1,000 cc.) are added, and the free iodin titrated with tenth-normal sodium thiosulphate solution (24.83 gm. per liter). The thiosulphate is run in gradually, with constant shaking, until the brownish yellow color (iodin) has been largely destroyed; then 2 cc. of starch paste (1 gm. to 200 cc.) are added and the titration continued until the blue particles have entirely disappeared. Toward the end of the reaction the flask should be stoppered and shaken thoroughly.

"The copper equivalent of the thiosulphate is determined by diluting 25 cc. of a standard copper solution with water, evaporating and titrating exactly as in the test. The standard solution is prepared by dissolving 10 gm. of pure dry metallic copper in 200 cc. of concentrated nitric acid, and making up to a liter with water at 20° C. The solution should be analyzed gravimetrically, and will keep almost indefinitely. From this data the reducing action of the sugar solution can be readily calculated in terms of copper, and by conversion tables the corresponding amount of sugar."

A new volumetric method for the determination of manganese, F. J. METZGER and R. F. MCCRACKAN (*Jour. Amer. Chem. Soc., 32 (1910), No. 10, pp. 1250, 1251*).—The solutions used are a tenth-normal potassium permanganate solution, a solution of ferrous sulphate of about equivalent strength, and a solution of manganous sulphate carefully standardized gravimetrically by weighing as pyrophosphate. The method is as follows:

"Place 50 cc. of the standard manganese solution in a 300 cc. Erlenmeyer flask, add 10 to 15 cc. of concentrated sulphuric acid, and allow to cool. Add 1 to 2 gm. of finely powdered sodium bismuthate in such a way that none of the powder sticks to the sides of the flask. Place the flask in a beaker of water so that the level of the solution is several inches below the level of the water in the beaker. Heat slowly to boiling and boil till the precipitate of basic bismuth compound settles well and has a granular appearance (about 20 minutes' boiling is usually necessary). Remove the flask and cool under running water, add a known excess of ferrous sulphate solution, dilute to about 200 cc., and titrate back with standard permanganate solution.

"The manganese standard of the permanganate is calculated from the reaction which may be represented thus: $Mn^{++++} + 2Fe^{++} \longrightarrow Mn^{++} + 2Fe^{+++}$. Or the value of the permanganate in terms of iron multiplied by 0.4918 gives the value in terms of manganese."

The detection of small amounts of manganese in foods, DUMITRESCOU and MLLE E. NICOLAU (*Ann. Falsif., 3 (1910), No. 23, pp. 370–372*).—The method consists of oxidizing the manganese (if present in the ash) with a 40 per cent solution of ammonium persulphate, adding a drop of 2 per cent cobalti-nitrate to the solution, and boiling, when the characteristic permanganate color will be obtained.

Judging the quality of wheaten and rye flour, O. RAMMSTEDT (*Ztschr. Offentl. Chem., 16 (1910), No. 12, pp. 231–243*).—A critical discussion of the results obtained by various authors and the methods employed for investigating the quality of flour. The author has also conducted some catalase tests, in which it was noted that ignited sea sand was capable of liberating oxygen from hydrogen peroxid mechanically. See also previous note (E. S. R., 22, p. 411).

Detection of cotton-seed oil in olive oil, R. MARCILLE (*Ann. Falsif., 3 (1910), No. 20, pp. 235–238; abs. in Chem. Ztg., 34 (1910), No. 85, Repert., p. 346; Analyst, 35 (1910), No. 413, pp. 356, 357*).—In Halphen's test the author finds the reaction more sensitive if the oil and reagent are heated in a sealed glass tube at a temperature of 120° C. When 1 per cent of cotton-seed oil is present a distinct coloration is obtained in 12 minutes. With small amounts of oil it is necessary to heat for 6 hours but care must be taken not to exceed a temperature of 120°, as at from 130 to 150° pure fats and oils, especially olive oils, yield a coloration with the reagent. By preparing standards of olive oil containing known amounts of cotton-seed oil an approximation can be obtained, by comparison, as to how much cotton-seed oil is present in the olive oil in question.

The detection of urotropin in musts and wines, VOISENET (*Ann. Chim. Analyt., 15 (1910), No. 7, pp. 266–268*).—The method consists of the following: Take 25 cc. of the wine, acidify with 2 drops of sulphuric acid, distill slowly in a distillation flask, and collect the distillate in a test tube which is graduated up to 50 cc. Reject the first 5 cc., but add to the following 5 cc. 1 cc. of the albumin reagent and 18 cc. of the nitrous-hydrochloric acid reagent, and then agitate and heat in the water bath. In the presence of urotropin a violet coloration will be produced.

The chemistry of vanilla beans, S. ISERMAN (*Tea and Coffee Trade Jour., 19 (1910), No. 1, pp. 21–26, figs. 7*).—From a number of careful experiments made to discover the chemical character of the different constituents of the vanilla bean the author reaches the conclusion that the natural flavor of vanilla bean will not be reproduced by artificial means for many years to come.

Additional notes for methods in fat analysis, E. B. HOLLAND (*Massachusetts Sta. Rpt. 1909, pt. 1, p. 139*).—Continuing previous work (E. S. R., 22, p. 212), the author draws attention to the importance of using a definite amount of indicator (1 cc.) and a definite temperature (40 to 45° C.) for conducting titrations for the saponification and acid numbers of the fat and the neutralization number of the insoluble acids. Sulphuric acid was found preferable to hydrochloric acid for the decomposition of the soaps in the estimation of insoluble acids. The variable results obtained in determining the iodin number, are probably due to the volatilization of the iodin, and may be made more uniform by moistening the cork with a solution of potassium iodid.

Stability of butter fat samples, E. B. HOLLAND (*Massachusetts Sta. Rpt. 1909, pt. 1, pp. 132–138*).—The author sought to determine whether butter samples as ordinarily handled underwent any changes, and whether these appreciably affected the analytical results.

The results show that light in the presence of moisture produces a loss in color, but no marked acceleration in the loss of color was present in the absence of air. Air, on the other hand, always induced a uniform destruction of color. The chemical results show that added moisture in the absence of air had no appreciable action in excess of the check, nor did light alone in the presence of moisture show any change for a period of 18 months, while the check sample was somewhat decomposed. Moist air increased hydrolysis and water and light hastened the process. When air was absent, added moisture seemed to have no influence on the unsaturated compounds, whereas both light with and without moisture checked the oxidation process somewhat. The author points out that light is a factor in both oxidation and hydrolysis, but finds the explanation for the latter difficult. He concludes that "filtered butter-fat samples can be satisfactorily preserved in well-stoppered bottles."

Except for the fact that heating gave a very slight increase in the acid number no other changes were noticeable. It is therefore concluded that butter fat heated to temperatures up to 50° C. undergoes practically no change.

The use of the Zeiss immersion refractometer in the detection of watered milk, P. H. SMITH and J. C. REED (*Massachusetts Sta. Rpt. 1909, pt. 1, pp. 148–153*).—The method recommended by Leach and Lythoe (E. S. R., 16, p. 742) was further studied, and on the basis of results obtained with milk from 3 herds and some samples which were systematically skimmed and watered, the authors conclude that "the serum of a milk of known purity is not likely to have a refractive index below 40. It seems probable that the refractive index depends, to an extent, upon the stage of lactation of the cow, being highest in the advanced stages, when the animal is giving but little milk. More data are needed, however, to confirm this statement. Rich milk, containing 4 per cent or more of fat, has a tendency to give a higher index of refraction than thin milk (less than 4 per cent fat). This rule, however, does not always hold true.

"Many milks, especially those produced by Jerseys and Guernseys and their grades, can be adulterated with 10 per cent of water, or 5 per cent of water and 5 per cent of skim milk, and escape detection by means of the index or refraction. In case of very rich milk, i. e., pure milk containing 6 per cent of fat, it may be possible to add 20 per cent of water, or 10 per cent of water and 10 per cent of skim milk, without positively detecting its presence by the aid of the refractometer.

"It is believed that the Zeiss refractometer will prove very helpful in the detection of added water in milk. The evidence furnished, however, must be considered in connection with that secured by direct chemical analysis. It is believed that the percentage of ash in milk is likely to prove fully as helpful in many cases as the index of refraction in detecting the presence of added water. Mixed milk falling substantially below 0.70 per cent of ash must be regarded with suspicion, and that testing below 0.65 per cent of ash as watered."

Catalase estimation in milk, N. GERBER and A. OTTIKER (*Milchw. Zentbl., 6 (1910), No. 7, pp. 316–327, figs. 3*).—A discussion as to the use of the Lobeck apparatus (E. S. R., 23, p. 13) for determining the catalase in milk and utilizing the results for differentiating normal from pathologic and colostrum milks and pasteurized from unpasteurized milk. The results of the tests are appended.

Estimation of butter and coconut fat in margarin, S. H. BLICHFELDT (*Jour. Soc. Chem. Indus., 29 (1910), No. 13, pp. 792–794, figs. 2*).—The author devised a method and an apparatus, which is illustrated, to overcome some of the difficulties encountered with the Polenske method (E. S. R., 15, p. 850).

Examination of the constituents of coco butter; composition of coconut oil, A. HALLER and A. LASSIEUR (*Abs. in Chem. Ztg., 34 (1910), No. 57, p. 509*).—In order to render the copra edible it is heated with superheated steam, which decolorizes it and drives off noxious odors. Coco butter owes its disagreeable odor to an oil the chief constituent of which is methylheptylketon and methylnonylketon, but which also contains small quantities of an unisolated aldehyde, which is optically active.

Determining lactic acid quantitatively by estimating the amount of aldehyde split off, O. VON FÜRTH and D. CHARNASS (*Biochem. Ztschr., 26 (1900), No. 3–4, pp. 199–220, figs. 2*).—From the results of the works the authors conclude that Ripper's method (E. S. R., 13, p. 524) is to be given the preference over the usual titrimetric iodoform method. The oxidative splitting off of aldehyde from the lactic acid, it is shown, goes on in a uniform manner, and while it does not do this in an absolutely quantitative way the basis of the reaction can still be considered a good one for a quantitative method.

Other modifications introduced by the authors included substituting an ordinary distillation apparatus for a complicated apparatus, drawing air through the apparatus during the process, and reducing the concentration of the sulphuric acid used in conjunction with the permanganate.

The estimation of salicylic acid by the distillation of its dilute aqueous solutions, N. C. Cassal (*Chem. News, 101 (1910), No. 2639, pp. 289, 290*).—The author draws attention to the fact that the usual method of extracting salicylic acid with chloroform or ether from wine, sirups, etc., has many disadvantages, and further that such substances as tartaric and citric acids, alcohol, glycerin, and sugar have an inhibitory effect on the volatilization of the acid. If purely aqueous solutions are dealt with, and no substances which interfere are present, the salicylic acid which distills over is in proportion to that present in the sample. The application of this principle for wines is given, with the results of some analyses obtained with the method.

Estimation of the ash in cane sugar, fillers and sirups by the electrical conductivity method, A. Trenkler (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw., 39 (1910), No. 3, pp. 437–441, figs. 2*).—The author, after discussing the Main method (E. S. R., 22, p. 10) and the Lange method (E. S. R., 23, p. 307), reports determinations of the soluble and insoluble ash by the ordinary method and by the electrical conductivity method. The latter method gave good results for the soluble ash. A cheap form of apparatus for determining the electrical conductivity which the author has found satisfactory is described.

Temperature correction in estimating dry substance in sugarhouse products with the immersion refractometer, V. Staněk (*Ztschr. Zuckerindus. Böhmen, 34 (1910), No. 9, pp. 501–508*).—Correction tables giving the number of scale divisions to be added or subtracted to the refractometric reading found on examining sugarhouse products are presented.

Decomposition products of glucose in cane sugar molasses, H. C. Prinsen Geerligs (*Internat. Sugar Jour., 12 (1910), Nos. 138, pp. 293–305; 139, pp. 332–338*).—The results show that under normal factory conditions some of the invert sugar is broken up into compounds which in part volatilize and in part remain behind and appear in the analytical results as part of the unexplained balance in the juices, sirup, and molasses. The retained bodies are only slightly optically active, are capable of undergoing still further decomposition, and have an indefinite and unstable reducing power, which is less than that of the original invert sugar.

As the retained compounds are not volatile but are combustible they are, on analysis, neither found in the ash nor in the water determination, nor are they detected with the real gummy matter, and are only partly precipitated by basic lead acetate. Taking into consideration all the facts, it appears that these bodies still behave like the sugars.

Standards for mixed molasses feeds, Neubauer (*Deut. Zuckerindus., 35 (1910), No. 28, pp. 557–559; abs. in Chem. Ztg., 34 (1910), No. 92, Repert., p. 380*).—A discussion of the present standards, in which it is suggested as proper to define accurately what constitutes normal molasses and molasses constituents, and further, in what proportion the various constituents are added to the feed. It is not necessary to set down the highest allowable water content. Guarantied amounts of sugar, fat, and protein are not absolutely necessary, but desirable.

Standards for mixed molasses feeds (*Deut. Zuckerindus., 35 (1910), No. 29, pp. 577–580; abs. in Chem. Ztg., 34 (1910), No. 92, Repert., p. 380*).—Comments on the above article are given.

A moisture tester for grain and other substances and how to use it, J. W. T. Duvel (*U. S. Dept. Agr., Bur. Plant. Indus. Circ. 72, pp. 15, figs. 13*).—This method and apparatus, previously reported (E. S. R., 18, p. 1122), has been slightly modified, and specific directions have been prepared for estimating the moisture in the more important cereal grains.

An asculin and fat-splitting enzym in Æsculus hippocastanum (common horse-chestnut), W. Sigmund (*Monatsh. Chem., 31 (1910), No. 7, pp. 657–670*).—In the bark and seed coats of the horse-chestnut the author detected an enzym which splits asculin into asculetin and glucose, and for which he proposes the name "asculase." In the cotyledons of the seeds a fat-splitting enzym was also noted.

The drying of cider apples, G. Warcollier (*Bul. Assoc. Franç. Pomol., 27 (1909), No. 2, pp. 81–134*).—An inquiry into the different methods of drying cider apples on a small and large scale and in different localities. The cost of production, prices received for the product, analyses of the dried cider apples and the cider produced from them, and a comparison of cider made from the fresh and dried apples are discussed. Regulations regarding the use of the pear for cider making are also given.

[Manufacture of apple and pear brandy], G. Warcollier (*Bul. Assoc. Franç. Pomol., 27 (1909), No. 2, pp. 135–156*).—A study with particular reference to the aldehyde content of apple and pear brandy and the methods for its removal.

Methods of extracting olive oil, F. Bracci (*Bul. Dir. Agr. Com. et Colon. [Tunis], 12 (1908), No. 48, pp. 387–390; abs. in Chem. Zentbl., 1909, I, No. 10, pp. 878, 879; Chem. Abs., 4 (1910), No. 14, p. 1912*).—In one of these methods the olives are ground into a pulp and heated to from 30 to 40° C. with an equal volume of soda solution. An electric current is then passed through the mixture while the air injector keeps the mass in constant motion. After separation the oil is heated with a 1.5 per cent alum solution. This method gives a high yield of virgin oil, but it is off flavor and turns rancid very easily.

The use of alum and soda, according to the author, is superfluous, and better results may be obtained by the use of water. Saponification also causes a certain amount of loss in the yield.

Manufacture of milk sugar, F. A. Nilsson and S. A. Hellquist (*Swedish Patent 28,264, Feb. 19, 1908; abs. in Chem. Ztg., 34 (1910), No. 65, Repert., p. 254*).—Skim milk is deprived of its chief protein content by coagulation and concentrated to a specific gravity of 1.11. Filtration and further precipitation are then resorted to, these removing the remaining proteids and other bodies, and the resulting fluid is concentrated for the crystallization process. The crystals are freed from the fluid by centrifuging.

[Potassium cyanid from molasses waste], J. I. Brittain (*Weekly Cons. and Trade Rpts. [U. S.], 1 (1910), No. 15, pp. 700, 701*).—A general description of the manufacture of potassium cyanid from molasses waste in Germany and Austro-Hungary.

METEOROLOGY—WATER.

Dry farming in relation to rainfall and evaporation, L. J. Briggs and J. O. Belz (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 188, pp. 71, pl. 1, figs. 23*).—This bulletin was prepared to aid prospective settlers in regions of limited rainfall, and contains a discussion of the relation of the quantity and distribution of the rainfall and of evaporation to crop production under dry-farming methods in various sections of the Western United States, including the Great Plains, Intermountain and Pacific coast regions, and southern Texas.

In the discussion account is taken of seasonal distribution of the rain, the rate at which the rain falls, the amount lost through run-off from the surface, and the proportion lost by evaporation. Tables are given which show the normal rainfall at every station in these regions where precipitation records are available.

It is shown that while the method of alternate cropping and summer fallowing is the most highly developed dry-farming method, it is not the best method for all dry-farming regions. "In dry-farming sections where the rainfall is not so limited as in Utah, and especially in regions having a summer rainfall, other methods give as good or better returns."

[Meteorological observations], G. Feilden (*Ann. Rpt. Dept. Agr. Trinidad and Tobago, 1909–10, pp. 15–20*).—Tables are given which show the monthly and annual rainfall at the Botanic Gardens of Trinidad from 1862 to 1909; the monthly rainfall at 74 stations in the islands of Trinidad and Tobago during 1909; the mean annual pressure, temperature, humidity, and rainfall at the Botanic Gardens from 1888 to 1909; observations at St. Clair Experiment Station on pressure, temperature, humidity, and rainfall, summarized for each month of 1909; and the daily and monthly sunshine record at the Botanic Gardens during 1909.

The water supply of the earth, W. Halbfass (*Wasser, 6 (1910), pp. 88–91; abs. in Wasser u. Abwasser, 3 (1910), No. 4, p. 417*).—It is maintained in this article that the water supply of the continents is decreasing as a result of the regulation of floods, the reduction of standing water surfaces, the drainage of swamps and moors, and the extension of soil culture.

The importance of subterranean water to agriculture and forestry, Keilhack (*Arch. Deut. Landw. Rats, 34 (1910), pp. 571–591; Ztschr. Prakt. Geol., 18 (1910), No. 4, pp. 125–130*).—This paper points out the necessity for careful study of the underground water with a view to more strict control of the water supply in the interest of agriculture and forestry.

Influence of the forest on the underground waters, G. F. Morozov (*Dnevn. XII. S"iezda Ross. Est.-Isp. i Vrach., No. 8, p. 336; abs. in Zhur. Opuitn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 1, pp. 85, 86*).—Observations on two wells dug on the same watershed in the Shipov forest in 1901 are reported.

In 1903 the forest around one of the wells was cut down, and for two years the level of the water did not change. In the spring of 1906, however, a rise of water was observed which continued until the water was 60 cm. in 1908 and 70 cm. in 1909, above its level in 1901. During the 9 years of observation the level of the water in the other well remained unchanged.

Notes on some recent contributions to the study of desert water supplies, G. W. Grabham (*Cairo Sci. Jour., 4 (1910), No. 46, pp. 166–174*).—This article discusses the sources, nature, extent, and variation of the underground water supply, based mainly upon observations in the Kharga Oasis by H. J. L. Beadnell.

On the creation of an artificial water table in Egypt, H. T. Ferrar (*Cairo Sci. Jour., 4 (1910), No. 46, pp. 153–156, dgms. 2*).—Observations made in 150 experimental wells in lower Egypt are cited in support of the view that there are two water tables in the Nile alluvium, "(1) a natural water table which is independent of the works of man, except locally where extra permeability allows a constant supply of irrigation water to be added, (2) an artificial water table which was created by the act of the introduction of perennial irrigation by Mohammed Aly Pasha. It is thought that this artificial water table has gradually become higher, owing mainly to excessive watering of crops, until at the present day it has a deleterious effect upon the fertility of the soil."

An artificial water table, A. Lucas (*Cairo Sci. Jour., 4 (1910), No. 47, pp. 198, 199*).—This is a brief discussion of an article by Ferrar on this subject noted above. The author does not find "any evidence of a secondary permanently saturated zone above the level of the infiltration water and separated from and independent of it." Instead of the water table's reaching a maximum position about November 1 the author fixes the date at any time between September 28 and January 11.

The ground-water level, Haedicke (*Ztschr. Prakt. Geol., 18 (1910), No. 5–6, pp. 209–216, figs. 16; abs. in Wasser u. Abwasser, 3 (1910), No. 4, pp. 150–155, figs. 5*).—The author distinguishes between ground water and storage water, the ground water rising and falling independently of rainfall but being maintained in part by precipitation and in part by condensation of the moisture of the air in the soil. Various experiments and observations illustrating the character and behavior of the different forms of soil water are described.

The iron content of drainage water, J. Haas (*Jour. Landw., 58 (1910), No. 2, pp. 141, 142*).—An examination of the drainage water from large casks used in experiments comparing fallow with different systems of cropping showed that there was practically no iron in the drainage from fallow soils but varying amounts in those in which alfalfa had been grown, the largest amount being observed during the period of decomposition of the roots of the alfalfa in the soil. The author concludes that the products of decomposition of the alfalfa roots exerted a solvent action on the iron compounds of the soil.

On the suspended matter in water of the Java rice fields, E. C. J. Mohr (*Ann. Jard. Bot. Buitenzorg, 1910, Sup. 3, pt. 1, pp. 221–225*).—In a study of the composition and molecular relation of the suspended matter the author found that the principal ingredients were those of clay (Al_2O_3, SiO_2, H_2O). There appeared to be a different molecular relation from that of kaolin. Iron occurred in ferric form, probably as 1 F_2O_3 to 6 or 7 Al_2O_3. Lime and magnesia were present in small quantities. The titanic acid present was probably formed from the iron titanate through the action of carbon dioxid and water in the presence of organic substances. No definite molecular relation could be established between SiO_2 and Al_2O_3 from a study of the hydrochloric acid (20 per cent), sodium carbonate (5 to 10 per cent), and sodium hydroxid (5 per cent) extracts. The author submits the hypothesis that the colloidal silicic acid and alumina are precipitated at the same time as hydrates and in such a way that the silicic acid is not taken up again by sodium carbonate solution.

The water of the Columbia and Willamette rivers, C. E. Bradley (*Jour. Indus. and Engin. Chem., 2 (1910), No. 6, pp. 293, 294*).—Analyses of samples of Willamette River water collected at Corvallis in July, 1909, and of Columbia River water collected at Mayger in August, 1909, are reported.

The results show that the Columbia water is "relatively rich in carbonate of lime obtained no doubt from its upper course where lime formations are found. The soil of the Willamette Valley, on the other hand, contains only traces of carbonates, which is reflected in the low content of carbonates in the Willamette water. The tributaries of the Willamette are generally high in silica."

Water supply of eastern Virginia, A. Jeffers (*Manfrs'. Rec., 58 (1910), No. 15, p. 56*).—The origin and character of the artesian water supply of this region are described. It is stated that "the question of an ample supply of pure, healthful water for Tidewater, Virginia, is already solved, and a good article is within reach of every enterprise and every home."

The purification of muddy waters, A. C. H. Rothera (*Jour. Dept. Agr. Victoria, 8 (1910), No. 7, pp. 437–442, figs. 2*).—It is stated that much of the available water in Victoria contains a considerable amount of mud in suspension which does not sink under the force of gravity. Filters have not proved a satisfactory means of removing this mud, but tests are reported which show that iron chlorid is a very effective precipitant.

An analytical and epidemiological study of farm water supplies, K. F. KELLERMAN and H. A. WHITTAKER (*Amer. Jour. Pub. Hyg., 20 (1910), No. 3, pp. 654–657*).—A summary of investigations more fully reported elsewhere (E. S. R., 22, p. 16).

Hypochlorite treatment of public water supplies: Its adaptability and limitations, G. A. JOHNSON (*Engin. Rec., 62 (1910), No. 12, pp. 321–323*).—This article explains the present status of this method of treatment and its advantages and disadvantages.

Recent experiments on the sterilization of large quantities of water by means of ultraviolet rays, V. HENRI, A. HELBRONNER, and M. DE RECKLINGHAUSEN (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 16, pp. 677–680, figs. 2; abs. in Rev. Sci. [Paris], 48 (1910), II, No. 18, p. 571*).—An apparatus is described which utilizes three-fourths of the rays of the lamp and is capable of sterilizing 25 cubic meters of water per hour at an expense of 26 watt hours per cubic meter. Water containing from 30 to 300 germs per cubic centimeter and from 50 to 1,000 coli per liter before treatment contained only one germ per cubic centimeter and no coli after treatment.

Some profitable methods of utilizing municipal waste, L. ST. G. WILKINSON (*Surveyor, 38 (1910), No. 972, pp. 327, 328*).—This paper gives a short résumé of some ways of utilizing what are usually termed the waste products of some of the nonproductive departments of a corporation. Several processes of utilizing night soil and the waste products of sewage works are discussed. The successful use of sewage for growing sugar beets is referred to as well as the difficulty of making any profitable use of sludge.

Sewage disposal, W. RAMSAY (*Jour. Roy. Inst. Pub. Health, 18 (1910), No. 10, pp. 577–588*).—This paper discusses the development, present status, and difficulties of sewage disposal in Great Britain, and is based to a large extent upon the report of the Royal Commission on Sewage Disposal. Reference is made to the fact that in the early days of sewage treatment it was hoped that precipitation by means of chemicals would yield a sludge of high fertilizing value. The work of the commission and of other investigators has indicated, however, that sludge so obtained is of very little fertilizing value.

SOILS—FERTILIZERS.

[Papers on soils and soil investigations] (*II. Conf. Agrogéol. Internat. Stockholm, 1910, Résumé [1], pp. 7–10; 11, 12, fig. 1; 13–16; 17–20; 23, 24; 31–33; 36–38; 40; 41, 42; 51–55; 56–58; Résumé 2, pp. 1–3; 4*).—An account of this congress held at Stockholm in 1910 is given on page 298 of this issue. Among the papers presented were the following, dealing with soils and soil investigations:

The mechanical analysis of soils, A. Atterberg (Résumé [1], pp. 7–10).—This article explains the principles of the leading methods of mechanical analysis of soils, notes lack of agreement as to classification of soil particles, and proposes a classification of the fine soil in 5 groups as follows: Coarse sand between 2 and 0.3 mm., fine sand between 0.3 and 0.03 mm., microscopic silt (Schluff) between 0.03 and 0.003 mm., fine silt, and colloids, the last two being smaller than 0.003 mm.

Various precautions to be observed in order to secure accurate separation by sedimentation methods are described, but it is pointed out that all such methods are more or less defective. The author recommends the use of hydrochloric acid instead of nitric acid to break up soil aggregates and sodium hydroxid instead of ammonia for extraction of humus. It is pointed out that the root hairs of leguminous plants are too large to penetrate a soil consisting of particles finer than 0.03 mm., which is the dividing line between fine sand and silt. The root hairs of grasses can not penetrate a soil composed of particles finer than 0.002 mm. Most bacteria are not active in soils composed of particles under 0.003 mm. in size.

Mechanical soil analysis, P. Vinassa de Regny (Résumé [1], pp. 11, 12).—In this abstract is described a modified Appiani sedimentation cylinder which is provided with a movable siphon permitting control of the depth of water used in the sedimentation. The advantage claimed for this apparatus is that it saves time, requires a smaller quantity of water, and secures greater uniformity in size of soil particles.

The importance of colloids in soils, E. Ramann (Résumé [1], pp. 13–16).—In this abstract it is stated that colloids may consist of crystalloids as well as of amorphous bodies. The amorphous bodies, however, were more easily changed into the colloidal state. Very finely powdered crystals went into suspension with all the characteristic properties of colloids. Reduction of surface, as by drying, freezing, etc., greatly decreased absorption. Fixed compounds of a soil rich in colloids went into solution when the soil was dried. Air-dry soils allowed from two to three times as large a quantity of salts to go into solution with water as moist soils.

Protective colloids, or bodies with colloidal properties, enable many substances to go into the colloidal state. Certain humus substances act as protective colloids, iron and aluminum hydroxids and silicates becoming active under their influence in the presence of water. Under certain soil conditions and the influence of certain salts the protective colloids lose their characteristic properties and approach the crystalloids in character. Such retarding bodies are called protective crystalloids. The strongest of these are the metallic salts, especially the calcium compounds, the latter being the typical protective crystalloids of the soil.

Absorptive unsaturated bodies like clay and humus are very plastic, more or less slimy, swell with water, and form impervious soils. Absorptive saturated soils are porous, and do not swell with water. Absorptive saturated soils were easily made unsaturated and changed into the colloidal state by causing the absorbed bases to go into solution by treatment with acid. The action of the colloids was stronger with soils poorer in soluble salts.

The surface soil, unlike the subsoil, is exposed to many factors which were found to reduce the colloidal properties of the soil substances. Periodical drying and freezing showed a tendency to change the "sols" into "gels." Cultivation and fertilizers affected the colloids of the surface soil much less favorably than those of the subsoil. The constituents of the surface soil were more easily saturated and changed into the "gel" condition than those of the subsoil.

The action of the colloids is apparently important in the nutrition of plants. The author is of the opinion that the colloids of the roots establish an equilibrium with those of the soil, and thus enable the nutrients of the surface soil to be taken up more readily than those of the deeper layers.

The colloid substances in soils and their determination, D. J. Hissink (Résumé [1], pp. 17–20).—This article discusses the Van Bemmelen acid method of determining colloids (E. S. R., 16, p. 957) and compares results by this method with those obtained with the Atterberg, the sedimentation, and the color methods (E. S. R., 22, p. 610).

The physiological rôle of nutrient salts in the soil, D. Dicenty (Résumé [1], pp. 23, 24).—The author discusses in this article the bearing on plant growth of the concentration of the soil solution, with reference particularly to phosphoric acid. It is held that, other conditions being the same, the growth is better the larger the amount of the nutrient salts in the soil solution, and this in turn depends upon the amount of fine particles from which the nutrient salts may be derived.

The determination of the assimilable plant food in the soil, A. Rindell (Résumé [1], pp. 31–33).—This article deals mainly with the kind of solvent to be used in determining the assimilable plant food in soils. The author favors a water solution of carbon dioxid, which gives results comparable with those obtained in vegetation experiments. The concentration of this solution is not specifically stated.

New principles of soil investigation, A. Atterberg (Résumé [1], pp. 36–38).—In this article the author expresses the opinion that the most important physical properties of soils are firmness, water-holding capacity, plasticity, and movement of water, and that the two most important physiological properties are the degree of fineness of soil particles at which the root hairs of legumes can not penetrate the soil, and the degree at which bacterial life is impossible.

The purpose and fundamental principles of soil classification, E. W. Hilgard and R. H. Loughridge (Résumé [1], pp. 40).—The paper of which this is an abstract discusses "first the objects to be attained by soil classification, whether practical or theoretical. It then presents the various points of view from which soils are and may be considered, and the inadequacy of any single one; finally, the possible agreement upon a common basis of classification and description."

The nomenclature and the classification of soil types, B. de Inkey (Résumé [1], pp. 41, 42).—This is an abstract of a paper which deals with soil classification on the basis of (1) soil components, (2) petrography of the subsoil, (3) geographical and geological genesis of the soil, (4) physicochemical genesis, and (5) relation to climate and vegetation.

Plant food, especially phosphoric acid and nitrogen, in acid soils and their determination, M. Weibull (Résumé [1], pp. 51–55).—This is an abstract of a paper in which investigations are reported which show that acid soils responded better to nitrogenous and phosphatic fertilizers than neutral or alkaline soils. Acid soils yielded much less phosphoric acid to fifth-normal nitric acid by the Stoddart method (E. S. R., 20, p. 1114) than alkaline soils, although containing practically the same total phosphoric acid. The reaction of the soil depends upon the lime and humus content and the presence of certain silicates. If the first two are known the reaction may be reckoned. Soils showing assimilable lime (by the Meyer method) and loss on ignition in the proportion of about 0.1 per cent of the former to 2 per cent of the latter are usually neutral. The author proposes and has undertaken the mapping of soils on the basis of their reaction.

Some methods of analysis in soil investigations, A. Vesterberg (Résumé [1], pp. 56–58).—In this paper descriptions are given of a titration method for the determination of carbonate, carbonic acid, and organic substances; a rapid field method for the determination of calcium; a titration method for humic acid solutions; and a method for determining the water-soluble salts by electrolytic conductivity.

Some notes on the mechanical analysis of soils, especially of those of arid regions, W. Beam (Résumé 2, pp. 1–3).—In this article the author objects to the of acid to break up soil aggregates. He uses the classification of soil particles recommended by the Bureau of Soils of this Department and follows to a large extent the methods proposed by that Bureau. In an attempt to substitute a fine sieve for the separation of fine silt and clay, as suggested by Lucas, the author found an error of as much as 16 per cent. As a quick method of obtaining useful information in many cases the author recommends that the limit for clay be fixed at 0.01 mm. with a subsidence of 30 minutes in a column of water 7½ cm. high.

The study of soils in Egypt, W. F. Hume (Résumé 2, p. 4).—In this article the author makes a plea for a systematic soil survey of Egypt and outlines a plan for such survey.

The First International Agrogeological Congress, E. J. Russell (*Nature [London], 84 (1910), No. 2127, pp. 157, 158*).—This is a brief review of the report of this conference held at Budapest in 1909, particular attention being given to a paper by Glinka on Russian soils (E. S. R., 23, p. 316).

The Mkatta plains, P. Vageler (*Tropenpflanzer, Beihefte, 11 (1910), No. 4–5, pp. 247–395, pl. 1, figs. 11*).—A general description of the Mkatta plains of East Africa with special reference to the topography, hydrography, climatic conditions, vegetation, and soil types is given, and the relationship between the vegetation and different types of soils is discussed. The method of procedure and the apparatus used in the investigation are described. Full data for climatic conditions, and physical and chemical analyses of each of 8 soil types are reported, and the characteristic vegetation of the different types is described.

Special attention is called to the fact that very often vegetation changes its characteristics under similar climatic conditions, such change being due to differences in the character of the soil. The author traces a distinct relation of the formation and the physical, but not the chemical, properties of soils to the vegetation on virgin soils within a given climatic area. A district of similar climatic conditions, particularly with regard to quantity and distribution of rainfall, producing a certain type of vegetation, will have a certain type of soil.

By establishing definite soil types for the different climatic districts the number of types will be considerably reduced, lessening the labor and cost of soil investigation.

The control of blowing soils, E. E. Free and J. M. Westgate (*U. S. Dept. Agr., Farmers' Bul. 421, pp. 23, figs. 10*).—The authors discuss the normal movements of the soil, the causes and control of soil blowing on sandy, newly cleared, and other lands, and the control of drifting sand and sand dunes by plants and mechanical devices. Other problems discussed are protection of irrigation ditches, embankments, and roads, and the blowing of frost-loosened and cutover soils.

It is shown that the blowing of soils is of much importance in humid as well as in dry regions and although the effects are in the main bad, benefit is sometimes derived from the process by the mixing of soil particles and the renewing of surface layers. The most practical means of control consists of the use of systems of cropping and tillage which will provide protection of each plant or rough surface soil at critical stages and will keep the soil well stocked with humus.

On methods of bacteriological soil investigations, J. Vogel (*Centbl. Bakt. [etc.], 2. Abt., 27 (1910), No. 22–25, pp. 593–605, dgm. 1*).—The author claims that in investigations on soil bacteriology the experiments should be performed, not in solutions, as is usually done, but with the soils themselves, by which method simplicity in operation and substantial agreement in parallel determinations in the laboratory reactions and field experiments will result in the majority of cases.

The author illustrates the value of this method by a series of experiments involving various soil bacteriological problems, such as the nitrifying energy of soils, seasonal variations in nitrification, the relationship of crop production to nitrifying energy in the soil, and the action of straw or other organic material in the soil on bacterial action.

A study on nitrogen transformation in soils, W. Krüger (*Ein Beitrag zur Untersuchung der Stickstoffumsetzungen im Boden. Inaug. Diss., Königsberg, 1908, pp. 58; rev. in Bot. Centbl., 114 (1910), No. 9, pp. 238, 239*).—Experiments were made on the influence of quicklime, calcium carbonate, and soil aeration on nitrification, denitrification, nitrogen fixation, and the decomposition of nitrogenous organic matter in humus, calcareous, and sandy soils, respectively. The experiments were conducted with culture media, using the Buhlert and Fickendey soil suspension method (E. S. R., 18, p. 120).

It was found that the quicklime and calcium carbonate exerted a favorable influence on all the bacteria concerned in the transformation of nitrogenous compounds in the soil. The experiments show that each soil exerted a different influence on the nitrogen transforming bacteria independent of the fertilizers and aeration.

In the fertilizer and aeration experiments, the sandy soils showed a smaller nitrogen fixation and nitrification power than the calcareous and humus soils, while the denitrification power seemed about equal in all the samples.

In the experiments on the influence of different fertilizers on the power of each soil to decompose nitrogenous organic matter, it was found that when limed the humus soil stood first and sandy soil second in this respect. Marked variations were obtained in the effects of the fertilizers on different soils, caused apparently by changes in the physical and chemical composition of each soil due to weather conditions.

The author claims that by the method used no conclusion can be reached concerning the condition of each soil, and that therefore only by actual tests can it be determined whether liming and aeration will exert a favorable or an unfavorable influence on the growth and multiplication of the bacteria.

Legume inoculation and the litmus reaction of soils, K. F. Kellerman and T. R. Robinson (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 71, pp. 11*).—This circular reports a continuation of investigations on soil conditions affecting legume inoculation (E. S. R., 18, p. 533) and is based upon examinations of "many different soils both in the field and by samples, with a view to correlating, if possible, certain of their characteristics with their behavior toward the growth of legumes and the nodule bacteria of legumes."

The results are recorded of the relation between inoculation for alfalfa, vetch, and crimson clover, and the litmus reaction of the different soils as determined by the following method: "Strips of neutral litmus paper are placed in the bottom of a number of petri dishes; over these are laid four thicknesses of filter paper and on the filter paper are placed the soil samples to be tested. Just enough water (tested and found neutral) is added to saturate the soil on the filter paper. Covers are placed on the petri dishes, and they are allowed to stand for one hour. A check petri dish containing only litmus paper and filter paper moistened with the same water is allowed to stand under the same conditions."

The authors conclude from the results obtained that "the modified petri-dish method, using neutral litmus paper, gives valuable comparative data for studying legume inoculation.

"Alfalfa inoculation is most inhibited by soils which redden litmus, and is most successful in soils which blue litmus or in those which leave the litmus paper unchanged. Crimson clover inoculation is limited little, if at all, by soils of varying litmus reaction. Vetch inoculation seems midway between that of alfalfa and that of crimson clover. A sharp distinction must be drawn between successful inoculation and successful crop production. For alfalfa the conditions favoring successful inoculation seem identical with those favoring the alfalfa crop. While the limitations for either inoculation or crop production with vetch are less sharply drawn, their relationship or interdependence is perhaps as marked as with alfalfa. Crimson clover, on the other hand, may be inoculated even on soils which redden litmus, yet under these conditions liming or manuring is often of great benefit in crop production."

Studies in soil oxidation, O. SCHREINER, M. X. SULLIVAN, and F. R. REID (*U. S. Dept. Agr., Bur. Soils Bul. 73, pp. 57*).—This bulletin, which is based upon investigations by the authors and by others, deals with "reduction and oxidation by roots, concurrent oxidation, and reduction by roots, and oxidation within the soil itself. The fact that roots possess the power of reduction was shown by the precipitation of tellurium and selenium from sodium tellurite and selenite, respectively. The oxidative power of the roots was shown by means of organic compounds, which, on oxidation, yield dyes which either color the solution or are deposited on the root surface. These two opposite properties may occur separately or concurrently, depending upon the reaction of the medium. The oxidation within the soil itself is shown by the same reagents as those showing oxidation by the roots. The reagent most successfully used in the case of soil is aloin, a yellow water solution of which is changed to a claret red by the oxidation. The depth of color can be measured and is taken as an indication of the extent of the oxidation.

"This oxidation appears to be mainly nonenzymotic, the result of interaction between inorganic constituents and certain types of organic matter. It may also be brought about by organic matter in a state of autoxidation and by inorganic oxygen carriers, such as manganese and iron. Both processes activate oxygen.

"The oxidation in soils was increased by the addition of salts of manganese, iron, aluminum, calcium, and magnesium, especially in the presence of simple hydroxyacids, such as citric, tartaric, malic, glycolic, and their salts. The best oxidation was obtained by the addition of manganese, and the stimulating action of manganese used as a fertilizer is attributed to its oxidizing power; i. e., to its amelioration of soil conditions rather than its function as a plant nutrient. Fertilizer salts augment the oxidizing power of roots, and the fertilized soil has an increased oxidizing power after cropping. The fertilizer salts alone sometimes increase, sometimes decrease, the oxidative functions of the soil itself, thus showing that the fertilizer salts are effecting changes directly or indirectly in the soil constituents, more particularly in the organic matter. Some types of organic matter, such as dihydroxystearic acid, isolated from certain soils, inhibit oxidation in the soil, but in the main the oxidative power is augmented by a plentiful supply of organic matter, the nature of which in the soil is the limiting factor of oxidation. Excessive oxidation is harmful to vegetation. . . .

"Soils oxidize substances in a manner analogous to an oxidase, and the increase noticed by the addition of certain hydroxyacids is closely paralleled by the recently discovered activating action of salts of tartaric and citric acids on the oxidative action of manganese acetate. This analogy between the oxidative power of a soil and the action of an oxidase is especially significant in that an oxidizing enzym, laccase, of alfalfa, has been found to be more simple in compositon than formerly supposed and to consist of neutral salts, mainly calcium, of glycolic, mesoxalic, malic, and citric, and probably glyoxylic acid. . . .

"Whatever decreases the oxidation in soils tends also to bring about the conditions which decrease growth, and the factors which favor oxidation are the factors which favor soil productivity."

Some biochemical investigations of Hawaiian soils, with special reference to fertilizing with molasses, S. S. Peck (*Hawaiian Sugar Planters' Sta., Agr. and Chem. Bul. 34, pp. 39, pl. 1*).—Ammonification, nitrification, denitrification, and nitrogen fixation were studied with three samples of cane soil by (1) inoculating nutrient solutions with small amounts of the soil, or (2) observing the progress of nitrogen transformation in the soils themselves.

The relative effect of varying amounts of dextrose and molasses (the latter containing 42 per cent of sucrose and 11.9 per cent of invert sugar) was tested in these experiments.

The results, although not entirely conclusive on all points under investigation, showed that "molasses applied at intervals on land on which cane is growing and fertilizer had been applied will work harm by destroying nitrates already applied or by preventing the formation of nitrates from other sources of nitrogen supplied in the fertilizer. Molasses applied to land lying fallow or at an interval of several weeks prior to the planting of the crop may produce beneficial results by providing a stimulus to the nitrogen-fixing bacteria of the soil and thereby adding a store of nitrogen to the soil in a form which can be made readily available to the crop at a later date by the other organisms in the soil."

The organisms transforming nitrogen were found in considerable numbers down to a depth of 4 ft., but were most abundant near the surface except in the case of the nitrogen-fixing organisms, which were apparently equally active at all depths examined.

In comparative tests of gypsum, calcium carbonate, sodium nitrate, potassium sulphate, carbon bisulphid, dextrose, molasses, and superphosphate, "the addition of lime, as carbonate, sulphate, or phosphate, stimulated ammonification. Nitrate of soda and carbon bisulphid depressed the process. Dextrose had a slightly beneficial effect, but was considerably surpassed in this respect by molasses. The addition of this material and that of potassium sulphate produced equally favorable results. No relation can be discerned between the number of organisms and the degree of ammonification, confirming Lipman and Brown's results [E. S. R., 23, p. 621] referring to the effect of dextrose in increasing the absolute numbers of organisms in a soil, but not the relative ammonifying power. . . . The most efficient hindrance to denitrification was rendered by carbon bisulphid."

As regards nitrification, calcium carbonate exerted the most favorable action. Carbon bisulphid stimulated nitrification to a slight extent. The soils to which the sugars were added showed the maximum power of fixing nitrogen. The least effect was observed in the case of acid phosphate, and this is attributed to a checking of the activity of Azotobacter by the acidity resulting from the use of the superphosphate. The nitrogen-fixing organisms were not entirely destroyed by carbon bisulphid, and later, under favorable conditions of moisture and temperature, exceeded in numbers those in untreated soil. Both nitrifying and nitrogen-fixing bacteria were killed by an exposure of 10 minutes to a temperature of 85° C. In all of the soils examined there were present numbers of various forms of Protozoa, but these were entirely destroyed by pasteurization.

A bibliography is appended.

Whitney's new theory of soil fertility, P. Krische (*Ernähr. Pflanze, 6 (1910), No. 4, pp. 37, 38; abs. in Chem. Ztg., 34 (1910), No. 41, Repert., p. 162*).—This article presents data reported by Mitscherlich to show that fertilizing materially affects the composition of the soil solution.

Fertilizers, J. Fritsch (*Les Engrais. Paris, 1909, vols. 1, pp. 239, figs. 10; 2, pp. 255, figs. 15; rev. in Rev. Gén. Chim., 13 (1910), No. 8, p. 154*).—This is stated to be a complete monograph on progress in agronomic science and the manufacture of fertilizers and a useful manual for practical agriculturists and for school use. It treats of the subjects of nutrition of plants, the nature and use of farm and green manures and commercial fertilizers, special fertilizers for different kinds of crops, and fertilizer legislation and trade. See also a previous note (E. S. R., 22, p. 430).

Tests of sodium nitrate on beets grown for seed gave inconclusive results.

Nitrogen content and yield of crops as affected by different nitrogenous manures, B. L. HARTWELL, H. J. WHEELER, and F. R. PEMBER (*Rhode Island Sta. Bul. 143, pp. 291–305, pl. 1*).—This bulletin records the results of ten years' experiments on barley, Japanese millet, and oats grown in perforated, uncovered ash cans, which were sunk in the ground nearly to their tops, to determine the availability of nitrogen in starfish, bone, hoof meal, tankage, acid fish, horn meal, and hen manure in comparison with dried blood and sodium nitrate.

"Considering the entire ten-year period, all of the sources of organic nitrogen, including the dried blood, proved to have about the same high degree of availability. Although the crops from nitrate of soda frequently contained larger percentages of nitrogen, they were not much heavier than those from the organic nitrogenous materials.

"It is probable that the high availability of the organic manures was due in part to the fact that a neutral reaction of the soil was practically maintained, so that putrefaction and nitrification were favored. Inattention to this factor has doubtless led to misconceptions regarding the availability of many sources of organic nitrogen.

"During the ten years, 5.9 gm. of nitrogen per pot were removed in the crops from the soil to which no nitrogen was added in the manures. The sum of the smaller applications per pot, namely, 5.2 gm., nearly equaled this, and resulted in an increase in crops toward the close of the experiment of over 40 per cent in comparison with the crops secured where no nitrogen was added. The sum of the larger applications of nitrogen was about 50 per cent greater than that of the smaller ones; yet, even though this amount was apparently insufficient for the production of maximum crops, it failed to cause an average increase of more than about 9 per cent in excess of that produced with the smaller amount. The crops were, however, more nitrogenous so that the increase in the total nitrogen of the crops was a third greater than the increase in the crops themselves.

"The cost of the nitrogen alone, required to maintain a higher degree of productivity than that represented by the yields from the check pots, was of such magnitude as to emphasize strongly the desirability of adopting rotations including legumes, grass, and hoed crops."

The availability of certain unusual nitrogenous manures, B. L. HARTWELL and F. R. PEMBER (*Rhode Island Sta. Bul. 142, pp. 275–288, pl. 1*).—In view of the high price of nitrogen in standard organic fertilizing material and the incentive thus afforded to use nitrogenous materials whose fertilizing value is not well understood, pot experiments were made with a number of unusual materials, including "nitrogenous manure," an acidulated mixture of hair, felt, wool, and sometimes leather (nitrogen 7.41 per cent); "hide and skin meal" (nitrogen 8.09 per cent); "tartar manure," dried residue of tartar yeast (nitrogen 3.68 per cent); beet-refuse compound (nitrogen 6.24 per cent); and calcium cyanamid (nitrogen 18.08 per cent); in comparison with dried blood (13.62 per cent) and nitrate of soda (15.54 per cent). The cyanamid was included in the experiment mainly to ascertain its toxic effect when applied just before planting. Five crops, barley, millet, oats, millet, and oats, were grown successively on the same soil, a stony loam, in the pots.

"The 'nitrogenous manure' was the most valuable of the first four sources of nitrogen mentioned above, and yet it was only about half as valuable as blood.

"The 'hide and skin meal,' 'tartar manure,' and 'beet-refuse compound' were of very little value as sources of nitrogen, at least when applied immediately before planting as would be done in ordinary practice. The 'beet-refuse compound' was said to contain cyanids, on which account it is advised by the promoters that it be applied some time previous to planting. Under the conditions of the experiment slight toxic effects were noted in some cases with this material. The extravagant claims made for these substances as sources of nitrogen seem to be wholly contrary to the facts.

"The European calcium cyanamid, when applied immediately before planting, delayed considerably the germination and early growth of barley. The only ill effect observed with oats was the turning yellow of the tips of the seedlings. The millet did not appear to be affected injuriously. The ordinary directions that this material should be applied a few weeks before planting seem to be justified, at least with certain crops. When these directions were not followed, as in the present case, the material increased the crop less than was the case with dried blood."

Sodium nitrate as compared with ammonium sulphate, BREHMER (*Gartenwelt, 14 (1910), No. 28, pp. 342–344, figs. 3*).—These fertilizing materials were compared on various kinds of vegetables grown on a sandy humus loam.

The results showed the importance of soluble fertilizers for such crops as well as of the use of lime with ammonium sulphate. It was observed that peas and beans were checked in their early growth when grown on soils deficient in nitrogen and were benefited by applications of the nitrogenous fertilizers. The author is of the opinion that sodium nitrate is better adapted to top-dressing than ammonium sulphate on account of its quick action. Sodium nitrate, moreover, is easily washed into the subsoil, whereas the ammonium sulphate is more firmly held in the soil. The continued application of sodium nitrate tends to form crusts on the soil.

Comparative fertilizer experiments with lime nitrogen, BUCHNER (*Sächs. Landw. Ztschr., 58 (1910), No. 12, pp. 154, 155*).—Lime nitrogen was compared with ammonium sulphate, Norwegian nitrate, and sodium nitrate on oats, wheat, potatoes, and beets grown on a heavy deep clay loam soil containing much organic matter.

The results with the oats and wheat showed that sodium nitrate gave the best yields of straw, but that the lime nitrogen and Norwegian nitrate gave as high a yield of grain. With potatoes the lime nitrogen was almost as effective as the other fertilizers, the ammonium sulphate giving the highest yield. In case of beets the lime nitrogen was much less effectice than sodium nitrate.

Transformation of calcium cyanamid in arable soil, C. ULPIANI (*Gaz. Chim. Ital., 40 (1910), I, No. 6, pp. 613–666; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 16, p. 1027; Jour. Chem. Soc. [London], 98 (1910), No. 576, II, pp. 890, 891*.—Further experiments are reported which confirm the author's previously expressed view (E. S. R., 20, p. 924) that the transformation of calcium cyanamid in the soil is, at least primarily, a purely physico-chemical process in which micro-organisms play no part, and passes through two stages, (1) formation of urea, and (2) conversion of the latter into ammonium carbonate. Experiments are reported in which the conditions were such as to preclude the existence of life during the first stage, but were not conclusive as to the second stage.

The utilization of atmospheric nitrogen, A. W. CROSSLEY (*Pharm. Jour. [London], 4. ser., 30 (1910), No. 2421, pp. 329–341, pls. 2, figs. 2*).—This paper deals with the progress in the manufacture of nitrogen compounds from the air and the importance of the subject in England from the standpoint of national defense and welfare.

The utilization of peat in agriculture, H. D. HASKINS (*Massachusetts Sta. Rpt. 1909, pt. 2, pp. 39–45*).—The average composition of peat as calculated from analyses of 55 samples is given, with a discussion of the use and value of this material as a fertilizer. Pot experiments with millet are referred to, showing a low availability of the nitrogen of peat as compared with that of sulphate of ammonia. It is stated that peat has been found useful as a drier in fertilizers, but in view of the low availability of the nitrogen it must be excluded from mixed fertilizers as a source of nitrogen.

A new nitrogen-containing fertilizer produced in the electric furnaces, M. DE NANSOUTY (*Engrais, 24 (1909), No. 42, p. 1164; abs. in Chem. Abs., 4 (1910), No. 7, p. 944*).—An electrical process for the manufacture of aluminium nitrid is described. This compound yields ammonia when treated with water.

Our greatest plant food, G. E. MITCHELL (*Nat. Geogr. Mag., 21 (1910), No. 9, pp. 783–791, figs. 6*).—The sources, supply, and agricultural importance of phosphates, as indicated by the investigations of the Geological Survey and of several of the experiment stations, are discussed.

On the existence of three horizons of tricalcium phosphate in Algeria and Tunis, J. ROUSSEL (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 11, pp. 556, 557*).—The origin and character of three beds of phosphate alternating with marl are described.

Thomas slag: A short historical review, J. B. LINDSEY (*Massachusetts Sta. Rpt. 1909, pt. 1, pp. 77–81*).—This article summarizes information regarding the composition, fertilizing value, and use of slag.

The effect of gypsum on alkali in soils, W. F. SUTHERST (*Jour. Indus. and Engin. Chem., 2 (1910), No. 7, pp. 329, 330, figs. 2*).—Experiments in which varying amounts of gypsum were mixed with pure sodium carbonate and with alkali containing 24.45 per cent of sodium carbonate, 22.6 per cent of sodium chlorid, and 40.05 per cent of sodium sulphate, showed that gypsum does not fully convert sodium carbonate into sulphate. Using the amount of gypsum which would theoretically convert all of the carbonate into sulphate, it was found that 18 per cent of the sodium carbonate was not acted upon. The limit of conversion was reached when 5 parts of gypsum was added to 1 part of sodium carbonate in 100 cc. of water and with 10 parts of gypsum to 1 of the alkali.

The composition of seaweed and its use as manure, E. J. RUSSELL (*Jour. Bd. Agr. [London], 17 (1910), No. 6, pp. 458–467*).—This article discusses the use that has been made of seaweed for fertilizing purposes in various countries, and the fertilizing value of seaweed as indicated by analyses made by Anderson, Hendrick (E. S. R., 10, p. 934), and Toms. Summarizing these analyses it is stated that wet seaweed as gathered contains water 70 to 80 per cent, average 75 per cent; organic matter 13 to 20, average 18 per cent; nitrogen 0.3 to 0.8, average 0.5 per cent; potash 0.8 to 1.5, average 1.2 per cent; and phosphoric acid 0.02 to 0.17, average 0.09 per cent.

It is estimated that on the basis of the commercial value of the nitrogen, phosphoric acid, and potash present, a ton of seaweed of average composition is worth about $2.50. It is closely comparable with barnyard manure as a fertilizer but decomposes much more readily in the soil. It is said to facilitate the decomposition of manure when mixed with it in the heap.

The practical results of incineration of garbage to produce an ash fertilizer, T. D'ALTHOFF (*Jour. Soc. Cent. Agr. Belg., 57 (1910), Nos. 7, pp. 181–187; 8, pp. 212–214*).—A process used in Brussels and other Belgian towns is described. It is stated that the process yields ashes which contain nitrogenous compounds, phosphates, and potash in sufficient quantity to make them of considerable value as a fertilizer.

Worthless fertilizers, J. S. Burd (*California Sta. Circ. 56, pp. 2*).—Attention is called in this circular to attempts which are made from time to time to exploit unusual fertilizing materials, many of which have proved on investigation to be "totally without merit."

Résumé of work of the fertilizer section, H. D. Haskins (*Massachusetts Sta. Rpt. 1909, pt. 1, pp. 48–59*).—This article briefly reviews the activities of the Massachusetts Station during 1909 in "fertilizer control work and the examination of fertilizers, soils, refuse by-products, etc., forwarded by farmers and others interested in agriculture. The results of the year's work would indicate that a larger number of private formulas and home-mixed fertilizers had been used by the Massachusetts farmers than ever before. The work of the collection and inspection of licensed fertilizers has also increased during the year. A larger number of fertilizers was licensed this year than during the past season, and the collection and analysis of samples [1,042 samples collected and 613 analyzed] reach the highest number ever attained during the history of fertilizer inspection work in Massachusetts."

Data are presented which show the greater economy in the purchase of high grade as compared with low grade fertilizers.

Fertilizer analyses, A. J. Patten, O. B. Winter, and C. G. Clippert (*Michigan Sta. Bul. 263, pp. 33–74*).—This bulletin gives the results of analyses and valuations of 208 brands of fertilizers licensed for sale in Michigan during the season of 1910 and discusses the use of fertilizers. The main provisions of the state fertilizer law and the basis of valuation used are also briefly explained.

AGRICULTURAL BOTANY.

Investigations on Mendelian heredity, P. de Vilmorin (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 11, pp. 548–551*).—An account is given of experiments with peas in which the author studied the ratio of inheritance of tendril characters, color of leaves, and parchment in pods.

A variety of peas that was characterized by the absence of tendrils was crossed with an ordinary garden pea with the result that all the F_1 progeny bore tendrils. In the F_2 generation the segregation was in the proportion of 3 with tendrils to 1 without. The variety of peas that was without tendrils was characterized by wrinkling, while the other variety used in the cross had a round seed.

In studying these characters from the progeny of the crosses, the author found a correlation between the wrinkling of the peas and the absence of tendrils. The segregation in the F_2 generation of the leaf colors was practically 9 glaucous to 7 green. The presence of parchment was in the same ratio.

Plant breeding studies in peas, F. A. Waugh and J. K. Shaw (*Massachusetts Sta. Rpt. 1909, pt. 1, pp. 168–175*).—In a further study (E. S. R., 22, p. 230) of variation, correlation, and heredity in peas, it was found that the plants were markedly more variable in all their characters in 1909 than in 1908.

The amount of variation was less and the fluctuation less in the case of vine length, a vegetative character, than in pods per vine, a reproductive character. The vine length is also transmitted much more fully than either the number of pods per vine or the toal peas per vine, showing that the vegetative character is more stable and is more perfectly transmitted than the reproductive character.

On the origin and physiological functions of pentosans in plants, C. Ravenna and O. Montanari (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e. Nat., 5. ser., 19 (1910), II, No. 4, pp. 202–207*).—Continuing the study of this subject

(E. S. R., 22, p. 721) the variations in the quantity of pentosans present in plants during the daytime and at night were especially investigated.

In the plants (*Vicia faba minor*) examined, a tendency to an increase in the absolute quantity of the pentosans during the day and a decrease during the night was observed. It was also found that when sugar was furnished to the leaves a marked increase in the quantity of pentosans occurred, while the absence of carbohydrate foods and of photosynthesis diminished the amount of pentosans present in the plants.

On the phosphorus and ash content of the leaves of perennial plants, G. André (*Compt. Rend. Acad. Sci.* [*Paris*], *149* (*1909*), *No. 1, pp. 45–48; abs. in Zentbl. Agr. Chem., 39* (*1910*), *No. 7, pp. 458–460*).—The results are reported of investigations on the variations at different periods in the year of the phosphorus and ash present in the leaves of chestnuts.

It was found that the phosphoric acid in the leaves undergoes a marked diminution during the movements of nitrogen toward the inflorescence, while the phosphates soluble in water (mineral phosphates) are most abundant when the leaves are very young. Lecithins were much increased as the flowering period approached, and seemed to play a rôle in the osmotic phenomena which, at this period, aid in the passage of the nitrogen in the leaves toward the reproductive organs. The ash content was quite small and uniform during the entire life of the leaves of the chestnut and was especially poor in silica.

Some observations on the presence of free hydrocyanic acid in plants, C. Ravenna and M. Tonegutti (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e. Nat., 5. ser., 19* (*1910*), *II, No. 1, pp. 19–25*).—The authors claim that the usual methods used for detecting the presence of free hydrocyanic acid in plants (destroying the enzyms present in the leaves by boiling water or boiling alcohol) are untrustworthy, in that the enzym present in the leaves has time before it is destroyed to form an appreciable quantity of hydrocyanic acid from the glucosid present in the leaves.

In the new method proposed, boiling caustic potash is used to destroy the enzym, and the leaves are introduced into it one at a time, thus preventing a lowering of the temperature. The leaves of the cherry laurel tested by this method showed no trace of free hydrocyanic acid.

As a result of other experiments it is claimed that the decrease observed in the quantity of hydrocyanic acid found in air-dried leaves, compared to that found in crushed leaves macerated for 24 hours, is not due to a volatilization, but to a true assimilation of the hydrocyanic acid on the part of the leaves.

A physiological-chemical research on the root tubercles of Vicia faba, G. Sani (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 19* (*1910*), *II, No. 4, pp. 207–211*).—The author claims that at least two nitrogenous substances (asparagin and glycocoll) are elaborated by the bacteria in the root tubercles and are directly available as a source of nitrogen for the host.

The assimilation of nitrogen by certain nitrogen-fixing bacteria in the soil, W. B. Bottomley (*Proc. Roy. Soc.* [*London*], *Ser. B, 82* (*1910*), *No. B 560, pp. 627–629*).—A report is made of further investigations (E. S. R., 22, p. 122) on the fixation of free nitrogen in culture media and in soils by separate and mixed cultures of *Azotobacter chroococcum* and *Pseudomonas radicicola*, the former obtained from garden soil and the latter from the root tubercles of beans and clover.

After pure cultures of these two bacteria, separately and in combination, were incubated for 10 days at 24° C. in suitable culture media, the nitrogen content of the flask was determined, and the following averages obtained: For Azotobacter alone, 2.19 mg. of nitrogen in 100 cc. per unit of carbohydrate;

for Pseudomonas alone, 2.30 mg. of nitrogen; and for the two combined, 4.51 mg. of nitrogen.

Cultures of these bacteria under soil conditions were obtained by inoculating limed and sterilized garden soil with pure cultures of both Azotobacter and Pseudomonas, and then incubating for 21 days at 24°. Five grams of this infected soil in 100 cc. of water (plus 1 gm. of glucose) was then incubated for 24 hours and used as inoculating material for a series of tests on limed and unlimed garden soil contained in pots. At the end of an incubation period of 10 days at 24°, the pots inoculated with the mixed cultures of Azotobacter and Pseudomonas showed an increase in nitrogen, both in the limed (35 mg. per gram of soil) and the unlimed (25 mg. per gram of soil), over the uninoculated soil, amounting in the limed soil to nearly 350 lbs. per acre for a depth of 4 in.

The results of experiments now in progress on the utilization by higher plants of this fixed nitrogen will be given in a future paper.

On growth stimuli, A. J. Nabokich (*Bot. Centbl., Beihefte, 26 (1910), 1. Abt., No. 1, pp. 7–149, charts 6*).—The results are reported of investigations on the secondary action of water, on the action of a vacuum, and on the influence of bases, salts (especially halogen compounds), and oxygen on plant growth.

It is claimed that resting cells and mature parts of plants with a reduced metabolic assimilation are able to remain for a long time without injury in an oxygen-free atmosphere, but that, on the contrary, young growing cells in the absence of oxygen soon succumb, with the typical symptoms of the poisoning of the protoplasm resulting from certain metabolic assimilation products. The more vigorously the plants manifest their capacity for growth and for metamorphism of organic substances, the more energetically the poisoning occurs.

Air, however, with its normal gas content seems to be an unfavorable medium for the growth of young plants. The growth occurs energetically in rarefied atmospheres, in gas mixtures containing small amounts of oxygen, and in water in which insignificant quantities of air are dissolved. The dampening of plants by means of sprays or guttation accelerates their growth. It seems that oxygen acts as a strong chemical reagent by exerting a stimulating influence on the protoplasm. Weak concentration of oxygen materially increased the activity of the protoplasm and therefore the growth of the tissues, while appreciable quantities of this gas checked cell activity, thereby hindering and stopping their growth.

From the experiments it seems certain that the action of alkalis, acids, and salts on plants is caused by the specific influence on the protoplasm of the ions found in the solution. The cations and anions of most compounds have been shown to produce effects opposite in character. The anions produce a strong acceleration while the cations hinder or limit growth.

The growth effects of the salt solution were found to be the average result of the opposite acting ions. In most cases the cations in the solution are dominant, and therefore determine the resulting effects on plant growth of a given salt.

The effects of radium rays on plants, C. Acqua (*Ann. Bot. [Rome], 8 (1910), No. 2, pp. 223–238*).—The results are given of the effects of radium rays on the germination of seeds, development of seedlings, carbon assimilation, growth of pollen tubes, and movements of protoplasm in several green plants.

It was found that a great difference in the reaction to radium rays existed between different species, and even between different organs of the same species. The root system in general responded to the action of radium, where a more or less complete arrest of development was shown, although many exceptions occurred. The aerial parts proved highly resistant to its action, showing no general response either in stems or foliage, nor was photosynthesis influenced by the rays. The pollen grains gave diverse results, some not growing at all, while others gave no reaction whatever to the rays.

The movements of protoplasm which were studied in the aerial hairs of the pumpkin, the internodal cells of Chara, and in the leaf cells of *Elodea canadensis*, were absolutely unaffected by the radium rays.

The acid content and acid resistance of various roots, K. Aso (*Flora, 100 (1910), No. 2, pp. 311–316*).—A preliminary report is given of investigations on the acid content and acid resistance of various plants. Roots of seedlings of mustard, peas, lupines, oats, barley, buckwheat, spinach, and potatoes were placed in solutions containing from 0.1 to 0.01 per cent of citric acid, and the behavior of the plants noted.

The greatest dilution of citric acid was found to be quite injurious to spinach, mustard, and peas, while its noxious effect was delayed somewhat with lupines, barley, oats, and potatoes. In general the plants in the earlier stages appeared somewhat more resistant to the acid than in the later stages, when the root hairs had been developed and chlorophyll functions had begun.

The resistance to sodium nitrite was investigated with cultures of mustard, lupines, peas, oats, potatoes, and buckwheat, and the amount of injury was found to be inversely proportional to the acid content of the roots.

The resistance of Medicago seed to high temperatures, O. SCHNEIDER-ORELLI (*Flora, 100 (1910), No. 2, pp. 305–311*).—Experiments were conducted with seeds of a number of species of Medicago to test their resistance to dry and moist high temperatures.

The seeds of some of the species are characterized by the hardness of the seed coats, and practically all such resisted temperatures approximating that of boiling water. In some instances the treatment favored the germination.

In one of the experiments one lot of seed was filed to cut through the hard seed coat, another placed in concentrated sulphuric acid for half an hour, while a third was untreated. More than $\frac{3}{4}$ of the treated seed germinated, while only 3 out of 20 in the check lot sprouted. The ungerminated seed were then filed, after which 15 out of 17 sprouted.

The experiments showed remarkable resistance to high temperatures on the part of seeds of *M. denticulata* and *M. arabica*, some of which germinated after 17 hours' exposure to a temperature of 100° C. or a half hour at 120°. A temperature of 130° destroyed all the seed. A small portion of the seed germinated after remaining $7\frac{1}{2}$ hours in boiling water, or $\frac{1}{2}$ hour in water heated in an autoclave to 120°. After the seed coats had been made permeable by any of the treatments the seeds were found to quickly lose their resistance to high temperatures.

The source of the drug Dioscorea, with a consideration of the Dioscoreæ found in the United States, H. H. BARTLETT (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 189, pp. 29, figs. 8*).—The taxonomic history of the Dioscoreæ of the United States is given, together with a synopsis of the species of Dioscorea and a discussion of the drug Dioscorea, with illustrations showing the various types of rhizomes now on the market.

FIELD CROPS.

A study of cultivation methods and crop rotations for the Great Plains area, E. C. CHILCOTT (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 187, pp. 78, pl. 1, fig. 1*).—This bulletin reports the results of 18 comparative tests at 11 stations in the Great Plains area, 3 years' results being obtained at Edgeley, N. Dak., and North Platte, Nebr.; 2 at Amarillo, Tex., Dickinson, N. Dak., and Highmore, S. Dak.; and 1 at Judith Basin, Mont., Belle Fourche, S. Dak., Akron, Colo., Dalhart, Tex., and Hays and Garden City, Kans. The author defines the terms, "ordinary methods," "conservation methods," and "alternate summer tillage" as used in this bulletin.

Experiments with wheat, oats, and barley were conducted at each station, the grain being grown (a) continuously by ordinary cultural methods on spring-plowed land; (b) continuously by moisture conservation methods on fall-plowed land; (c) alternating with summer tillage; and (d) with summer tillage alternating with grain. The wheat yields by ordinary, conservation, and summer tillage methods were 17.4, 16.5, and 22.5 bu. per acre, respectively. The same methods yielded respectively 30.2, 30.5, and 44.1 bu. per acre with oats, and 21.1, 22.9, and 30.7 bu. per acre with barley. These averages were for all stations at which the tests were conducted.

At each of the 11 stations, 5 identical 3-year rotations were instituted with wheat, oats, and corn, in 2 rotations barley was substituted for wheat, and in 2 others summer tillage displaced corn. "Rotations are so planned as to give an opportunity to compare the several rotations considered as units and also to compare the several crops grown in different rotations under systems of soil preparation and following different crops. As each rotation is represented by three plats, each of the crops entering into the rotation is represented every year." Wheat, oats, and barley in continuous cropping by ordinary methods yielded on the North and South Dakota, Nebraska, and Kansas plats during 1900–1909 17.4, 30.2, and 21.1 bu. per acre respectively, while in 3-year rotation they yielded 19.8, 36.3, and 24.3 bu. per acre respectively. Tables present the yields of grain in bushels per acre and their farm value per acre in each of the rotations in the 19 tests conducted during 1906–1909. Tables show the average farm value per acre yielded by each of the nine 3-year rotations and the gain or loss of each rotation for each test as compared with continuous cropping by ordinary methods.

Disked corn stubble proved superior to summer tillage preceding spring wheat and oats, giving an average net gain per acre of $4.08. Omitting the value of the corn from consideration the average gain in favor of summer tillage was $1.04, but even then disked corn stubble had the advantage in 7 of the 19 tests. Tests of fall and spring plowing gave negligible differences in results. The choice depends upon local conditions of soil and climate. Wheat, oats, corn proved a better sequence for spring plowing than oats, wheat, corn at most of the stations.

The author enumerates the experimental difficulties in work on rotations for the conservation of organic matter in the soil, but in the light of work already done, discusses the growing of corn, brome-grass, and small grains, and recommends a corn, wheat, brome-grass, brome-grass, small grain, and other rotations as adapted to the conservation of organic matter.

The author regards his conclusions as tentative and subject to modification by future results, but indicates that alternate cropping and summer tillage have not proved profitable and that certain 3-year rotations have proved more profitable than continuous cropping or alternate cropping. Corn on spring or fall plowing, followed by wheat or barley on disked corn stubble, and then by oats on early fall plowing, has given the best average results. Winter rye has so far given better results for green manuring than Canada field peas and sweet clover (*Melilotus alba*), perhaps because it can be plowed under before the end of the June rains. Flax may be grown on brome-grass sod as a catch crop after the hay is harvested. Winter wheat possesses several important advantages over spring wheat, fits in well in any rotation adapted to the Great Plains, and wherever it can be safely grown should constitute a considerable portion of the small-grain crop.

Systems of rotation adapted to local conditions are considered of greater importance in the Great Plains region than tillage methods. Precipitation records for the stations are appended.

Demonstration work on southern farms, S. A. KNAPP (*U. S. Dept. Agr., Farmers' Bul. 422, pp. 19, figs. 4*).—This supersedes Farmers' Bulletin 319 (E. S. R., 19, p. 1027). It gives a brief history of the movement, its plan of organization, and the scope of its demonstrations.

A statement of the system used for producing cotton under boll weevil conditions includes a discussion of the general principles followed, the destruction of weevils, proper preparation of the soil, early planting of early maturing varieties, fertilizing, wider spacing of plants and rows, the use of the harrow, the agitation of stalks by means of brush on the handles of the cultivator or plow, picking up fallen squares, selecting and storing seed, and rotation of crops. The occasional use of topping or of root pruning by means of barring off is suggested as a means of preventing the formation of a useless top crop.

Demonstration work with corn is more briefly outlined and the use of cowpeas and other soil renovating crops recommended. The good seed problem is being solved by the establishment of seed farms on which the crop is grown, selected, and stored under the supervision of the cooperative agent. In one county the corn grown by boys' clubs averaged 76 bu. per acre as compared with 16 bu. on the neighboring farms.

Report of the agriculturist, W. P. BROOKS, E. S. FULTON, and E. F. GASKILL (*Massachusetts Sta. Rpt. 1909, pt. 1, pp. 36–44*).—Investigations were continued in accordance with the general plan of previous years (E. S. R., 22, p. 231).

In the tests of different sources of nitrogen, the relative yields on the basis of 100 for nitrate of soda, were dried blood 100.5, sulphate of ammonia 87.14, barnyard manure 83, and with no nitrogen 72.34. The corresponding values for the 20 years of the experiment are 92.34, 86.47, 94.05, and 70.99.

During 1909, the eighteenth of the test of sources of potassium, sulphate of potash gave a heavier yield of corn by 5 bu. and a lighter yield of stover by 600 lbs. per acre than muriate. Blackberries winterkilled less on a sulphate of potash plat. The yields per acre following applications of muriate and sulphate were 6,002 and 3,257 lbs. respectively of asparagus, 22,786 and 28,349 lbs. respectively of rhubarb, 799.1 and 822.4 bu. respectively of carrots, and 24,344 and 24,400 lbs. respectively of cabbage. There were nearly three times as many pounds of soft heads of cabbage on the muriate plats as with the sulphate.

In the tests of manure with three commercial sources of nitrogen, each plat had in addition to dissolved bone black some combination of nitrogen and potassium sources. With muriate as a source of potash, applications of sulphate of ammonia, nitrate of soda, and dried blood were followed by yields of 359.2, 565.1, and 515.9 bu. respectively of No. 1 onions. The yields in the same order when the sulphate replaced the muriate were 412, 703.6, and 557.5 bu. per acre. Cauliflowers and asparagus also gave better yields after the sulphate. The plat where manure is used without fertilizers still produces nearly as good yields as those fertilized in addition to the manure.

The average yields of hay and rowen on the no-potash plats were 5,744 and 680 lbs. per acre, respectively, as compared with average yields of 6,412.6 and 1,555.4 lbs. on the potash plats. Clover was a comparative failure on the no-potash plats and timothy was notably heavier on the kainit plats.

The average yield of soy beans following 10 phosphatic fertilizers was 30.6 bu. per acre as compared with 27.8 on check plats. A 17.7 per cent increase—296 lbs. per acre—followed the use of steamed bone meal. Different phosphates produced little difference in results among themselves, or as compared with the yields on plats that have received no phosphate in 13 years. The bone meal plats of this series showed a 667 per cent increase of cabbage the previous year as compared with the check plat.

With corn, the use of manure alone was followed by a yield of 5,460 lbs. per acre of hay and rowen, and the use of manure and potash by 4,160 lbs. Drought accounts for the low yields.

The use of fertilizers rich in phosphoric acid and in potash resulted in yields of 5,094 and 5,320 lbs. respectively of mixed timothy, red top, and clovers. The proportion of clover was greater after the fertilizer richer in potash. Barnyard manure, wood ashes, and a mixture of bone meal and potash have given average annual yields of 6,373, 5,805, and 6,164 lbs. of hay respectively since 1893, and the yields during the past year were 5,394, 4,708, and 5,160 lbs. respectively. Winter and spring applications of manure yielded 7,505.6 and 7,141.2 lbs. respectively of hay and rowen. The spring application produced the heavier yield of rowen alone.

[Experiments with field crops], W. B. RAWSON, W. DIBBLE, F. GILLANDERS, J. DRYSDALE, and G. F. EARNSHAW (*New Zeal. Dept. Agr. Ann. Rpt., 17 (1909), pp. 123–132, 350–358, 365–373, 385–434, 442–447*).—General reports of the progress made in combating noxious weeds and of the condition of crops and of the grass-seed market are given, together with the general plan of experimental work at the 6 experimental farms.

In experiments for the purpose of finding grasses adapted to infertile lands, *Phalaris commutata* stood the frost well. All others were killed or injured by the frost or cold drying winds.

At the Waerenga farm the use of 10 cwt. of basic slag was followed by a higher yield of green grass per acre during each of the following 4 years than was secured after the same or smaller amounts of slag with kainit, or of superphosphate, sulphate of potash, lime, dissolved bone, bone dust, and sulphate of ammonia in various amounts and combinations.

The sowing of a mixture of *Paspalum dilatatum* and clover resulted in a preponderance of clover in the stand. Experiments in sowing grass mixtures with wheat and barley as nurse crops are also reported.

Applications of superphosphate, cyanamid, bone dust, dried blood, and sulphate of potash singly or in various combinations were followed by yields of oats approximately three times as great as those secured from the check plats. One cwt. of superphosphate and $\frac{3}{4}$ cwt. of cyanamid apparently produced higher yields than 1 cwt. of superphosphate alone or 2 cwt. of superphosphate and 1 cwt. of nitrate of soda. Notes are given on the results following applications of calcium cyanamid to oats, prairie grass, carrots, rape, turnips, maize, cowpeas, sainfoin, melilotus, and crimson clover.

The Evergood and Dalmahay varieties of potatoes produced approximately equal yields and proved blight resistant. The reports of the results of applications of superphosphate, whale meat, bone dust, nitrate of soda, and sulphate of ammonia in various combinations are given.

At the Ruakura Farm, 6 acres of Argentina oats yielded well and proved rust resistant. As a top dressing for oats 1 cwt. of sulphate of ammonia proved more profitable alone than with $\frac{1}{2}$ cwt. of muriate of potash and also excelled $\frac{1}{2}$ cwt. sulphate of ammonia or nitrate of soda or 1 cwt. of nitrate of soda. In another manurial experiment with oats, the highest profit followed an application of 1 cwt. superphosphate and $\frac{3}{4}$ cwt. of bone dust, while a loss followed an application of the same mixture in addition to $1\frac{1}{2}$ cwt. of dried blood and $\frac{1}{2}$ cwt. of sulphate of potash. An application of 2 cwt. of superphosphate and $\frac{3}{4}$ cwt. cyanamid produced a profit of 5d. per acre. In another experiment, the highest profit was secured after an application of 60 lbs. of sulphate of potash, while losses followed the use of superphosphate, muriate of potash, basic slag, nitrate of soda, or sulphate of potash in varying amounts and combinations.

In manurial experiments with Algerian oats profits of more than £13 5s. arose from applications of 1 cwt. each of superphosphate, basic slag, and bone dust in different combinations. First grade seed oats produced 75 bu. per acre and second grade 68 bu. Among 8 varieties of rust-resistant oats the Garten produced the most valuable crop. Mangels following sorghum and millet produced the highest profit apparently due to manures, when fertilized with 2 cwt. superphosphate and 2 cwt. basic slag per acre. Notes are given on sowings of sugar beets, carrots, turnips, rape and kale, and various fodder crops.

At the Moumahaki Farm, variety tests of wheat, barley, and oats are reported. Only the Algerian oat proved rust resistant. On pasture land, an application of nearly 2 cwt. of steamed bone dust was followed by a greater increase in profit than applications of other sources of phosphorus or of ground lime or Malden Island guano. Notes are given on the manuring and rate and method of planting of pumpkins, maize, sorghum, millet, cabbage, kohl-rabi, and carrots. Among fodder crops, Golden Beauty maize produced 35 tons per acre, Sinclair Champion carrot 28 tons of tops and 9¼ cwt. of roots, and Sutton Eclipse Drumhead cabbage 40 tons, 14¼ cwt. of feed.

In a test of 11 different applications of fertilizers to rape, the highest but least economical increase of yield was secured from the use of 2 cwt. of basic superphosphate. Cross dressings of nitrate of soda, sulphate of ammonia, and cyanamid produced no apparent improvement of the crop. On swamp land, an application of 2½ cwt. of superphosphate produced an apparent increase in yield of over 20 tons of rape at a cost of 14½ cts. per ton of increase.

An application of 4 cwt. of superphosphate was followed by a greater increase in yield of potatoes than the same application in addition to 1 cwt. of muriate of potash.

Vilmorin Improved sugar beets and Sutton Mammoth Long Red mangels produced the maximum yields of sugar and dry matter per acre respectively, while the most economical increase in yield of mangels after fertilizers was secured by the application of 4½ cwt. of superphosphate and 1 cwt. of gypsum. An absolute decrease in yield of 5 tons 9½ cwt. followed the application of 4½ cwt. of steamed bone dust and 1 cwt. of cyanamid.

Garton Superlative swedes produced the maximum yield of total dry matter per acre and the highest yield of roots and tops per acre and had only a trace affected by club root among 17 varieties so affected. The most economical increase in yield of turnips followed the application of 1¼ cwt. of superphosphate and 1¼ cwt. Malden Island guano, in a test of 25 different formulas. Notes are given on the application of lime with fertilizers, the turnip fly, on the breeding of oats, wheat, barley, and alfalfa, and on sowings of more than 75 different grasses and legumes.

At the Weraroa Farm, the Great Dakota oat produced the maximum yield of 60 bu. per acre. Four acres of Azov barley gave an average yield of 60 bu. per acre and the Clarence Wonder produced the maximum estimated weight of corn among 5 varieties of field corn, ranging from 50 to 75 tons per acre, while the Broad Yellow sweet corn produced an estimated yield of 70 tons per acre. Among 86 varieties of potatoes, the Up-to-date produced the maximum yield of 14 tons 2¾ cwt. per acre.

The seeding of clovers and grasses, M. F. Miller (*Missouri Sta. Circ. 42, pp. 61–64*).—This circular discusses the merits of timothy and clover and other meadow and pasture mixtures, orchard grass, various fertilizers, and the free testing of seeds at the station.

The seeding of alfalfa, C. B. Hutchison (*Missouri Sta. Circ. 40, pp. 53–56*).—Suggestions are made for inoculation, use of lime, seeding, harvesting, cultivation, and the choice of soil.

Alfalfa in New Hampshire, F. W. Taylor (*New Hampshire Sta. Circ. 9, pp. 4*).—The author discusses the causes of failure in alfalfa growing and gives directions for preparing the seed bed, seeding, inoculating, fertilizing, and harvesting. The feeding value and present status of alfalfa are also discussed.

Growing broom corn in Colorado, A. Keyser (*Colorado Sta. Circ. 9, pp. 16*).—This circular contains general information on the soils and regions adapted to broom-corn growing and makes suggestions as to choice of varieties, preparation of land, planting, cultivation, harvesting, tabling, cutting, sorting, thrashing, handling, and marketing.

Breeding and selection of corn, F. W. Taylor (*New Hampshire Sta. Circ. 10, pp. 8, figs. 2*).—Full directions are given for the purpose of enabling the farmer to conduct ear-row work for the improvement of corn.

The value of first-generation hybrids in corn, G. N. Collins (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 191, pp. 45*).—The author discusses the vigor of hybrids as a factor of production and the habits of the corn plant with reference to hybridization, and reviews previous experiments with first-generation hybrids, conducted by W. J. Beal [a] and others, in part already noted (E. S. R., 4, pp. 134, 904; 6, p. 29; 22, pp. 36, 41).

The author gives a brief account of 16 hybrids secured by crossing American varieties with a new series of types of corn from China, Africa, and the American Tropics. The height, yield, and character of ear of each of the hybrids and their parents are reported. The average percentage increase in yield of 14 of these hybrids over the averages of the parents is 53. A small Chinese variety averaging 0.39 lb. per plant was crossed on 5 varieties which averaged 0.764 lb. per plant. The average yield of the 5 hybrids was 1.004 lbs. per plant. The increased yields reported in the earlier work reviewed ranged from 4 to 95 per cent with a loss of 8 per cent in one case and no difference in another.

The work reported is regarded as indicating that corn needs the stimulus of crossing to produce maximum results. Close breeding tends to reduce vigor and yields. Raising hybrid seed requires no special skill or large increase of labor, and may render possible an extension of corn growing to large areas where it is now precarious. The advantages of crossing are equally applicable to sweet corn improvement. Plans are suggested for testing corn hybrids and for producing hybrid seed on a commercial scale at a central location, as the hybrid need not be produced in the locality in which it is used as seed.

Corn cultivation, C. P. Hartley (*U. S. Dept. Agr., Farmers' Bul. 414, pp. 32, figs. 25*).—The author discusses the possibility of increasing the yield by seed improvement, care in the selection of land for corn, attention to the absorption and retention of soil moisture, and the prevention of washing. Improvements are also suggested in fertilization, rotation, depth and methods of plowing, and cultivation and planting. Different types of cultivators are discussed. Frequent references to the literature of the subject are given.

The seeding of cowpeas, M. F. Miller (*Missouri Sta. Circ. 39, pp. 49–52, fig. 1*).—This deals with varieties of cowpeas, time and methods of seeding, harvesting, and thrashing, and the adaptability of the crop to growth with corn.

---

[a] Rpts. Michigan Bd. Agr., 1876, p. 206; 1877, p. 56; 1880, pp. 287, 288; 1881–1882, p. 136; see also Ann. Rpts. Purdue Univ., 1881, p. 87; 1883, p. 72.

Milo, A. Keyser and H. M. Cottrell (*Colorado Sta. Circ. 7, pp. 16, fig. 1*).—Directions for growing milo maize are followed by a discussion of its use as a feed for beef and dairy cattle, calves, hogs, sheep, and poultry.

Oats: Growing the crop, C. W. Warburton (*U. S. Dept. Agr., Farmers' Bul. 424, pp. 44, figs. 13*).—The author outlines the history of oats, describes the plant, and discusses with special reference to oats and oat production, types of soil, fertilizers, liming, rotations, preparation of the seed bed, cleaning, grading, treating for smut, date, rate, method and depth of seeding, cultivation, spraying to kill weeds, cutting back to prevent lodging, irrigation, cutting, shocking, stacking, shock thrashing, stack thrashing, storing, yields, cost of production, seed selection for crop improvement, diseases, and injurious insects. The varieties adapted to each of the different sections of the United States are specified. The publications of this Department and of the state experiment stations are freely cited and many of the statements are accompanied by the results of experimental work substantiating them.

Oats: Distribution and uses, C. W. Warburton (*U. S. Dept. Agr., Farmers' Bul. 420, pp. 24, figs. 4*).—This supplements the paper noted above. It gives statistical figures of the production and value of the oat crop of the world and of the United States, describes the market grades, summarizes data as to the composition of the grain and straw, and discusses their use as food for man and animals. The use of the crop for hay, pasture, soiling, as a nurse and cover crop, and of its by-products are dealt with.

Potato investigations, A. G. Craig (*Washington Sta. Bul. 94, pp. 31, figs. 5*).—The author outlines experimental work with potatoes under way, and gives brief descriptions of those of the 225 varieties tested which have not been discarded and a list of those unworthy of description.

A study of the inherited tendencies in hills of several varieties indicates "that the heaviest yielding hills are not always the best for seed, and that . . . the number of plants in a hill must be taken into consideration." Data obtained in this test are presented in tabular form. After the first year of the test one plat of each variety was planted with large and small tubers from the best hills, and another with seed from the medium to poor hills. The average yields of 12 varieties were 8,185 and 6,111 lbs. of marketable potatoes per acre respectively, and from 3 varieties used in the third year's work 9,426 and 4,583 lbs. per acre respectively. The tubers from the good hills were the more uniform in size and appearance.

Growing potatoes in Colorado, C. L. Fitch (*Colorado Sta. Circ. 8, pp. 22, figs. 10*).—The topics discussed include trueness to type, potato growing in Colorado, the essentials of a good eating potato, choice of varieties, seed selection, running out, rotation and plowing, planting, cultivation, irrigation, harvesting, storing, the most desirable size of potatoes for seed, and dry land and high altitude seed potatoes. A number of varieties are described.

The potato: Selection of seed and cultivation, E. A. Rogers (*Penn. Dept. Agr. Bul. 190, pp. 61, pls. 13*).—This bulletin presents general and popular information for the potato grower. Selection and preparation of the soil, and production, fertilization, harvesting, storing, and marketing of the crop are dealt with. Directions are given for combating insects and diseases.

Wheat growing in Missouri, F. H. Demaree (*Missouri Sta. Circ. 43, pp. 65–68, fig. 1*).—A discussion of wheat varieties and soils is followed by directions for sowing, fertilization, and the prevention of injury by smut and insect enemies.

Seed germination and separation, G. E. Stone (*Massachusetts Sta. Rpt. 1909, pt. 2, pp. 61–64*).—Germination tests for seeds of the onion, tobacco, corn, lettuce, pansy, celery, and several other plants are given.

It was found that when the faulty and light seeds were taken out, the remainder showed a much higher percentage of germination than samples from the same lot which had not been separated. This was especially true of such seed as tobacco, onion, and celery.

Seed purity work, 1909, G. H. Chapman (*Massachusetts Sta. Rpt. 1909, pt. 2, pp. 57–60*).—The results are given in tabulated form of purity tests of the seeds offered in the open market of timothy, red clover, redtop, oats, alfalfa, alsike clover, while clover, alfalfa clover, orchard grass, Agrostis, Kentucky blue grass, meadow fescue, millet, Italian rye grass, and yellow oat grass. The most common impurities found in these seeds were plantain, rib grass, sheep sorrel, and dock.

HORTICULTURE.

Experiments in breeding sweet corn, R. Pearl and F. M. Surface (*Maine Sta. Bul. 183, pp. 249–316, pls. 8, figs. 7*).—Experiments in breeding sweet corn, extending over 3 years, 1907 to 1909, are reported, including the important data and a brief account of the general features of the work. Further discussion of the more technical results has been reserved for later publication. The experiments were conducted with a view of helping both the farmer and the packer.

Two types of corn, differing chiefly in regard to earliness of maturity and fineness and depth of kernel, were dealt with in the experiments. Both types are white in color and the corn designated as type 1 is a superior variety in regard to the above named characteristics. Selection was conducted with both types for improvements relative to earliness of maturity, yield both of ears and stover, and the general conformation of the ear, especially with reference to the shape and covering of the tip with kernels. Selection was made of desirable plants in the field and between the ears harvested from these plants.

A marked gain in earliness was observed after the first year's selection of type 1 corn, but no further gain in earliness followed the selection practiced in the two subsequent years. Corn selected from type 2 in 1907 was grown in a new locality in 1908. The "new-place" effect appeared to offset the effect of selection as far as the crop in 1908 was concerned. In general the first year's selection has been followed by a marked improvement in respect to the conformation of ear and the gain has been maintained where the corn has been grown in localities to which it is well adjusted.

Two years' ear-to-row test furnished no evidence that there is any close association or correlation between the size or conformation of the seed ear and the yield of corn obtained from it upon planting. The present experiments point clearly to the conclusion that in any attempt to improve corn by selection, the fundamental datum must be the performance of the row planted on the ear-to-row system rather than the individual ear or plant. The authors, however, do not advocate the isolation of a single pure line of homozygote strain as the thing to be aimed at in practical corn breeding. The aim should be to get rid of poor genotypes from the breeding plats as a whole and to permit broad breeding between the rows of the selected seed.

The experiments thus far give no evidence that there is a cumulative effect of the selection of small fluctuating variations in sweet corn. A wide distribution of selected seed over the State in 1908 demonstrated the importance of the factor of local adjustment in the improvement of the crop by breeding. In 1908 type 1 corn did not show the same earliness throughout the State as on the station plats. In 1910, however, the corn appears to have adjusted itself to various localities and superior earliness was again in evidence.

A test of the effect of commercial fertilizer, in addition to manure, upon yield and earliness showed an increased yield of 21 bu. of dry seed per acre in favor of the fertilized plat. There were also less corn on nubbins and the remaining ears were of better quality. No effect was noticed on the earliness of maturity.

Without going into a discussion of the biological basis of the improvement in earliness, the authors are inclined to believe this improvement is in reality a physiological rather than a genetic or hereditary phenomenon.

The bulletin concludes with some practical suggestions regarding the growing of sweet corn in Maine, based on the experiments and observations reported. A rack for storing seed corn devised by the station and found very satisfactory is described.

Cabbage culture, H. P. Stuckey (*Georgia Sta. Bul. 91, pp. 111–129, figs. 17*).—Fertilizer, cultural, and variety tests with cabbage conducted during the past 2 seasons are reported and general cultural directions based largely on the experimental results are given, together with notes on insects affecting cabbage.

The general results secured from the cultural experiments are as follows: "Cotton-seed meal as a source of nitrogen gave better results than nitrate of soda when used under cabbage plants when set in the fall for spring heading. The open-furrow method of setting cabbage plants in the fall of the year for spring heading gave better results than setting the plants on a level, on the south side of the ridge, on top of the ridge, or on the north side of the ridge. The method is to be recommended for well-drained and well-prepared soil. From October 1 to October 20 was found to be the best time for sowing cabbage seed in this section for plants to head early the following spring. Plants from seeds sown early in September are likely to go to seed the following spring. Nitrate of soda when applied at the rate of 900 lbs. per acre as a side dressing gave more profit than did heavier applications."

A preliminary report on the vegetable growing industry in Oregon, A. G. B. Bouquet (*Oregon Sta. Bul. 109, pp. 48, figs. 13*).—This report embraces a brief discussion of the existing conditions in the State relative to the vegetable industry, together with practical suggestions for growing a number of the more important vegetables, including suitable varieties of each. A bibliography is appended.

[Fertilizer experiments at the cranberry substation], W. P. Brooks (*Massachusetts Sta. Rpt. 1909, pt. 1, pp. 31–33*).—Experiments with cranberry fertilizers (E. S. R., 20, p. 339) were continued in 1909.

As a result of observations and records so far made, it was found that the use of some fertilizer will clearly prove profitable on many bogs. During the year an estimated yield of 150 bu. of cranberries per acre was produced on the no-fertilizer plats, whereas 268 bu. per acre is the estimated average for all of the fertilizer plats and 306.5 bu. per acre was the average product on the plats where a complete fertilizer was applied.

Nitrate of soda greatly promotes the growth of vines and appears also to be favorable to fruitfulness, although it is believed that nitrate in excess of 100 lbs. per acre will seldom be necessary. High-grade sulphate of potash appears to promote fruitfulness, good color, and high quality. Phosphoric acid has had the least effect of the fertilizers employed, although it appears probable that when applied in soluble form, such as acid phosphate, it will be likely to promote early ripening and high color.

Orchard green-manure crops in California, R. McKee (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 190, pp. 40, figs. 9*).—The results of investigations involving cultural methods and tests of various crops conducted at Chico, Cal., and in cooperation with many orchardists for the past 5 years, are reported under the following general headings: The orchard districts of California, conditions under which green-manure crops should not be used, qualities desirable in a green-manure crop, methods of handling green-manure crops, winter green-manure crops now used in California orchards, summer green-manure crops, results of green manuring in California, results of tests with various legumes, promising green-manure crops, and the cost of seed of green-manure crops.

The investigation as a whole shows that green-manure crops are being used extensively only in the citrus and walnut orchards of the southern part of the State, although observations of a few plantings and experimental work show that by early seeding a good green-manure crop can be grown and in most cases can be profitably used in the northern citrus section. In deciduous orchard sections practically no green-manure crop is used, since water for fall irrigation is not generally available for starting the crop. A volunteer growth of bur clover, however, is usually sufficient by the time the orchards are plowed in the spring to yield considerable humus. In certain sections where adobe or similar soils prevail, the use of green-manure crops does not seem advisable, since cultivation must continue on such soils to prevent their becoming hard and packed. Whenever available, stable manure may be used to increase the humus supply in such soils.

The work has clearly indicated the superiority of certain crops over others and their adaptation for various purposes and conditions. Common vetch and field peas are the most generally used green-manure crops and together with bur clover are adapted to quite varied conditions. Peas or common vetch sown in the fall will generally need irrigation to make sufficient growth to be turned under early as a green manure. Earlier and heavier seeding is desirable for obtaining the best results. Woolly podded vetch also promises to be of value for deciduous orchard conditions. Fenugreek appears to be especially adapted to the coastal region. Of the various legumes tested hairy vetch is not well adapted for use as a green-manure crop in California, but black bitter vetch, black purple vetch, woolly podded vetch, horse beans, and the Tangier pea are considered to be promising new crops in comparison with common vetch. With the exception of horse beans in the northern portion, green-manure crops need no inoculation in California. The growing of a summer crop in California orchards is not advisable. Local and sectional conditions should be taken into consideration in determining the kind of crop and the best method of handling it.

Varieties of fruit originated in Michigan, S. W. Fletcher (*Michigan Sta. Spec. Bul. 44, pp. 3–87, figs. 32*).—This bulletin contains descriptions of 185 named varieties of orchard and small fruits, which have originated in Michigan and have been announced from time to time in the horticultural literature of the State. Introductory remarks deal with the importance of breeding new varieties, the kinds of new varieties needed in Michigan, and qualities which go to perpetuate a variety. Although Michigan has contributed very little to the widely grown varieties of fruit in this country, a number of varieties have been produced which are of considerable commercial importance within the State.

The Ben Davis group of apples, J. K. Shaw (*Massachusetts Sta. Rpt. 1909, pt. 1, pp. 176–193, map 1*).—A summarized study of the apples of the Ben Davis group relative to their history, distinguishing characteristics, and quality.

A study of the available literature together with information gleaned from authorities in systematic pomology gave a list of 40 varieties as possible candidates for this group. Twenty of these varieties, however, are believed to belong elsewhere or to be synonyms. The remainder are here separately considered and described.

Variation in apples, J. K. SHAW (*Massachusetts Sta. Rpt. 1909, pt. 1, pp 194–213, pls. 5, figs. 2*).—The results are given of a 2-years' investigation by statistical methods relative to the variation of the Ben Davis apple, which variety was selected as being the most widely cultivated of any commercial variety. The subject matter is presented under the two headings: The variation in size and form as grown in the Clark orchard of the Massachusetts Agricultural College and the variation in form, quality, and other characters when grown under widely varying conditions of climate and soil in the United States and Canada. Statistical measurements showing the means, standard deviations, and coefficients of variability are given and discussed and the variations are also graphically represented.

The data secured in the Clark orchard showed little or no relation between the size of the apples and the yield. There were slight differences in the variability in the size of apples from the different trees. The variability of the form of the fruit from different trees was less than that of size but was perceptible to the eye as were also differences in color. Apples from the top of the tree were a little larger than those from the lower branches and also slightly more variable. Apples from the lower branches were a little longer than those from the top of the tree.

Generally speaking, the Ben Davis gradually becomes more and more elongated in form the farther north it is grown. In correlating the variations in fruit characteristics with variations in meteorological data, it appears that the poor quality of the northern grown Ben Davis is due to an insufficient amount of heat to fully develop the fruit.

The work as a whole is summarized as follows: "Apples vary greatly in response to the widely varying conditions of soil, and more especially, climate, in the apple regions of North America. The Ben Davis variety seems to be especially variable. This variability may be accurately measured and studied by means of statistical methods. The most striking variation is in the external form of the apples, and this is accompanied by corresponding changes of the internal structure. The cause of this variation is some factor or factors of climate, which are closely related to latitude and the proximity of large bodies of water. It is probable that humidity or temperature, or both, may be the controlling factors. The differences in warmth of different growing seasons definitely affect the size of apples for that season. The most favorable temperature for development in size varies with the locality. It is lower in the North than in the South. The cause of the variation in quality is chiefly the varying amount of heat prevalent during the growing season. In order to develop satisfactorily in quality the Ben Davis should have an average monthly mean temperature of not less than 60° F. for the growing season, March to September, inclusive."

Natural variation of the apple as a factor in the perpetuation and improvement of varieties, V. H. DAVIS (*Ohio State Hort. Soc. Ann. Rpt., 43 (1910), pp. 40–44*).—In this paper the importance of selecting buds or scions of known desirable characteristics is discussed.

Manuring an apple orchard, W. P. BROOKS (*Massachusetts Sta. Rpt. 1909, pt. 2, pp. 10–20*).—Fertilizer experiments with apples originally planned by C. A. Goessmann have been in progress at the station for 20 years. A brief statement of the conditions and plan of the experiment and the leading results and conclusions are given.

The area devoted to apples is divided into 5 plats of about $\frac{1}{3}$ of an acre each. Each plat contains 12 trees, 3 each of Gravenstein, Baldwin, Roxbury Russet, and Rhode Island Greening. The soil is a strong gravelly loam, with fairly compact subsoil. The following manures and fertilizers have been applied to the various plats each year, starting in 1889, the year previous to planting: Plat 1, 20,000 lbs. of barnyard manure; plat 2, 2,000 lbs. of wood ashes; plat 3, nothing; plat 4, 600 lbs. of bone meal and 200 lbs. of muriate of potash; and plat 5, 600 lbs. of bone meal and 400 lbs. of low grade sulphate of potash. The fertilizers have invariably been applied broadcast in early spring and were mixed with the soil until 1895, since when the orchards have been kept in grass and the fertilizers used as a top-dressing.

As indicated by the circumference of the trees, the order of growth was plats 1, 5, 2, 4, and 3, and as indicated by the total yield of all trees to date, including 1909, the rank was as plats 1, 5, 4, 2, and 3. Plat 2 usually ranked first in color and general attractiveness of appearance of the fruit, followed by plats 5, 4, 1, and 3. During the early years of the experiment, plat 5 ranked first in size of the fruit, followed by plats 4, 1, 2, and 3, but in recent years, whenever the quantity of fruit was not excessive, the apples on plat 1 were usually larger than those of any of the other plats.

A number of tests of the keeping quality of the fruit usually gave plat 5 first place, followed by plats 4, 1, 2, and 3. The relative low quality of the fruit from plat 2 is attributed to the fact that it comes to maturity earlier than on the other fertilized plats. The author calls attention to the superiority of plat 5 over plat 4, the trees being much larger and producing a much greater amount of fruit. The only important difference in the application of fertilizer made to the 2 plats has been the use of low grade sulphate of potash in plat 5 instead of muriate, but no conclusion is reached as to the nature of the beneficial action, if there be any, exerted by the low grade sulphate.

Experiments upon a larger scale are being conducted to test the questions raised in the present work, but the results already show most decisively that apple trees must be fertilized to grow well and bear well. The stable manure furnished too large a proportion of nitrogen, the growth of the trees being rank, the foliage heavy, and the fruit overgrown, as well as coarse and inferior in color. Taking the work as a whole, the combination of bone meal with low grade sulphate of potash has produced the most satisfactory results.

Some practical suggestions are given relative to fertilizing orchards, and the question of sod versus tillage is briefly discussed although the author does not consider it as bearing directly on the experiment reported.

The box pack for apples, W. H. Wicks (*New Hampshire Sta. Circ. 8, pp. 6, figs. 7*).—Instructions are given for packing apples in boxes, including information relative to the package and packing material.

Apples and pears for export, C. P. Van der Merwe (*Dept. Agr. Orange River Colony, Hort. Div. Leaflet 6, pp. 12*).—Lists are given of varieties of apples and pears which have been found to do well in the Orange River Colony and which are recommended to be grown for export.

A biometric study of the seeds of a vinifera grape grown both on its own roots and as a graft, P. Seyot (*Assoc. Franç. Avanc. Sci., Compt. Rend., 38 (1909), pp. 556–569; abs. in Rev. Vit., 34 (1910), No. 878, p. 414*).—The author made a study of the seeds of the Tannat grape grown on its own roots and on a number of different stocks.

The general conclusions reached are that grafting has exerted a marked influence on seed dimensions of this variety and that the extent of this variation is influenced more or less by the particular stock employed. To a certain degree the variations appeared comparable to those produced by sexual hybridization.

Coffea robusta as a catch crop for Para rubber, P. J. S. Cramer (*India Rubber Jour., n. ser., 39 (1910), Nos. 12, pp. 791, 792; 13, pp. 861, 862; 14, pp. 43, 44, 46, figs. 8*).—This is essentially an account of robusta coffee (*Coffea laurentii*) relative to its history, culture, preparation, and commercial value, special attention being given to its culture as a catch crop with rubber. The author is of the opinion that robusta coffee is especially fitted as a catch crop on account of its early bearing habits. Under proper conditions it yields about 15 cwt. per acre 3 years from planting.

The ornamental value of the saltbushes, D. GRIFFITHS (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 69, pp. 6, pl. 1*).—A brief discussion of the ornamental value of the saltbushes with special reference to their adaptability to the arid and alkaline soils of the Southwest. Some of the species are evergreen in the warmer situations and will thrive on either alkaline or nonalkaline soils. Other species are hardy in cold climates. A number of species are rapid growers and adapted for hedges, since they shape up well and make a thick impenetrable growth. They thrive with a minimum of moisture, but respond readily to a greater supply. The main disadvantage of saltbushes is the brittleness of the wood.

FORESTRY.

Report of committee on breeding nut and forest trees, G. B. SUDWORTH (*Amer. Breeders Mag., 1 (1910), No. 3, pp. 185–193*).—This report deals particularly with the progress made by the forest experiment stations at Flagstaff, Ariz., and on Pike's Peak, near Manitou, Colo., in the breeding of tree seeds and the introduction of exotics.

Tests of seed were made from old western yellow pine, ranging in age from 280 to 425 years and from young western yellow pine, ranging in age from 125 to 145 years. The seed from the young pines gave 83.2 per cent germination, whereas the seed from the old pines gave only 68.4 per cent. Seed tests were also made of 9 different species of native conifers obtained from National Forests in 38 widely separated localities in the western half of the United States. The results are tabulated and discussed. Plantations with seed obtained from different sources as to region, elevation, age, and soundness of mother trees are to be made and studied for a number of years. During the past year an actual trial was made with 53 exotic species here listed, of which 39 are eucalypts. The judicious selection of tree seeds, improvement of the present forest by silvicultural treatment, and the introduction of exotics for the extension of forest regions are given as the 3 important problems for consideration.

Walnut-oak hybrid experiments, E. B. BABCOCK (*Amer. Breeders Mag., 1 (1910), No. 3, pp. 200–202*).—In the fall of 1907 the attention of the author was called to certain so-called walnut-oak hybrids growing in southern California. Without any facts to explain the identity of these trees experiments were conducted during the past 3 years to secure data that would either substantiate or discredit the hypothesis of origin through hybridization between oak and walnut. In 1908 crosses were made between the native walnut of southern California, *Juglans californica* as the female parent and the coast live oak, *Quercus agrifolia*, and one of the oak hybrids as male parents. Precautions were taken to prevent either self-pollination or outside pollination from other sources.

Twenty-seven nuts were procured from the oak-walnut cross and 13 nuts from the walnut-oak hybrid-walnut cross. Twenty-four trees were growing from the former nuts in 1909 and 12 trees from the latter. Owing to various adverse conditions no seed was procured from the crosses made in 1909, but in 1910, 151 nuts were secured from crosses between *Q. agrifolia* and *J. californica* and 29 nuts from crosses made between *Q. engelmanni* and *J. californica*. The seedlings are to be studied further.

The commercial hickories, A. T. BOISEN and J. A. NEWLIN (*U. S. Dept. Agr., Forest Serv. Bul. 80, pp. 64, pls. 6, figs. 17*).—This bulletin reports a detailed study of the commercial hickories conducted with the view of deriving information relative to the best means of producing and maintaining the necessary supply.

The study is reported under the following general headings: Economic importance of the hickories, the hickory supply, lumbering, the tree and its forms, range and distribution, soil and moisture requirements, tolerance, reproduction, growth, length of life, susceptibility to injuries, volume and yield, the wood and its mechanical properties, and the outlook for future supply. Growth, volume, and yield tables, based on measurements of different stands, are given. In the mechanical tests which were conducted at the Forest Service laboratory at Purdue University, moisture, weight, rate of growth, heartwood and sapwood, position in the tree, age, soil and situation, geographic location, species, and defects were considered as factors affecting strength, and the following points were determined: Specific gravity as tested and oven dry, weight per cubic foot as tested and oven dry, fiber stress at elastic limit, modulus of rupture, modulus of elasticity, horizontal shear at maximum load, work or resilience to elastic limit, work to maximum load, and total work. The data are tabulated and discussed.

The investigation as a whole showed that hickory has a number of important special uses for which no satisfactory substitute is known. The commercial supply is derived almost entirely from the true hickories, including the shagbark, big shagbark, big shellbark, pignut, and mockernut. Hickory-producing woodland is owned mainly in small holdings. Although the present stumpage prices are comparatively low, the expectations are that hickory will soon bring more adequate returns and it should rank among the more important timber trees of the managed wood lot.

The technical value of the wood differs greatly within the same species under similar silvicultural conditions and even within an individual tree. In general the wood put on by a thrifty tree during the period of its greatest vigor is the best and the wood from the butt cuts is superior to that from the upper cuts. For thrifty trees of the same age, there are no differences in value according to geographic regions or local soil conditions. The best criterion of the value of the wood is its weight. The heartwood, or red hickory, is equally as strong and tough as the sapwood, or white hickory, and should be placed on the same footing to prevent waste. Economy in the usage through closer cooperation and the adoption of a just log measure to improve the economic position of the tree are also recommended.

On the saving of damaged beeches, ECKSTEIN (*Naturw. Ztschr. Forst u. Landw., 8 (1910), No. 11, pp. 525, 526, fig. 2*).—The author briefly describes the method of saving young beech trees which have been injured by mice by mounding up the dirt around the trees, and also notes a case in which young beeches have reestablished themselves after injury by the production of secondary roots. The secondary root formation appears to have been aided by the presence of a good covering of leaf-mold which retained sufficient moisture for the roots to become established.

On the relation between yield performance and soil properties with the pine, W. SCHOENBERG (*Ztschr. Forst u. Jagdw., 42 (1910), No. 11, pp. 649–656, fig. 2*).—Physical and chemical analyses of a number of forest soils in the vicinity of Eberswald were made with a view of determining whether there is any definite relation between the yield of pine and the soil properties. The data are presented in tabular form and discussed.

The soils which consisted of valley sands and alluvial deposits showed considerable variation in their content of mineral foods. As a rule the soils containing the highest content of mineral foods showed the best yield performance, this being especially true as to phosphoric acid and lime. An examination of the mechanical texture of the soils indicated that there was a direct relation between the clay content and yield performance. Better yields were also noted on soils with a high humus content. The author points out, however, that much of this humus was probably derived from the forests themselves. He is of the opinion that emphasis should be placed upon the physical texture rather than upon the amount of mineral food in soils and that failure of fertilizer experiments in many forest soils is due to the poor water-holding capacity of the soil. Such soils may be improved by the incorporation of humus, removal of weeds, cultivation, etc.

Pine manuring experiments on the dunes of the Kurischen lowlands, K. Rackmann (*Naturw. Ztschr. Forst u. Landw., 8 (1910), No. 11, pp. 513–522, figs. 2*).—The results of some preliminary experiments undertaken in the Kurischen lowlands on the Baltic coast to determine the value of fertilizers for promoting the growth of pine seedlings in shifting sand dunes are reported. The fertilizer ingredients were limited to varying proportions of basic slag, kainit, and dried blood.

Considerable improvement was noted in the fertilized seedlings over those in unfertilized plats. The work is to be continued with a view of determining the best individual fertilizer and the best combination of fertilizers for sand dune culture.

The life history of Parthenium (guayule), J. E. Kirkwood (*Amer. Rev. Trop. Agr., 1 (1910), No. 7, pp. 193–205, pls. 3*).—In connection with his investigations relative to the propagation of guayule (*Parthenium argentatum*), the desert rubber bearing plant (E. S. R., 24, p. 151), the author collected some data on its life history which are here discussed. Among other facts brought out, it appears that guayule produces only about 17 per cent of fertile seed. The explanation of this is being sought in embryological research.

The rubber plants in northern Madagascar, H. Jumelle and H. Perrier (*Agr. Prat. Pays Chauds, 10 (1910), No. 90, pp. 184–196*).—A further descriptive account is given of the rubber yielding landolphias, mascarenhasias, and plectaneias in northern Madagascar (E. S. R., 23, p. 246).

The natural forests of Switzerland, H. and M. Brockmann-Jerosch (*Ber. Schweiz. Bot. Gesell., 1910, No. 19, pp. 171–224, map 1*).—A contribution to the knowledge of the plant geography of Switzerland with special reference to timber trees. Consideration is given to the natural development of timber stands in the past as well as the more recent development of timber stands as influenced by human agency.

An interesting phase of work in connection with the Davy School of Forestry, L. L. Scott (*Ohio State Hort. Soc. Ann. Rpt., 43 (1910), pp. 93–96*).—Some of the more important operations in tree surgery as practiced at the Davy School of Forestry are described.

DISEASES OF PLANTS.

Report of the botanists, G. E. Stone and G. H. Chapman (*Massachusetts Sta. Rpt. 1909, pt. 1, pp. 69–72*).—The work has been similar to that of other years (E. S. R., 22, p. 245). Of the usual number of fungus diseases commonly occurring in the State, several were more or less abundant, including rust on apples, beans, quinces, and roses, peach leaf curl, beet scab, leaf spot of the apple, and Alternaria leaf spot on muskmelons and watermelons.

Report on plant diseases from the Station of Vegetable Pathology of Rome, G. Cuboni (*Relazione sulle Malattie delle Piante Studiate durante il Biennio 1906–7. Rome: R. Staz. Patol. Veg., 1908, pp. VIII+80*).—In a report on the principal diseases of orchard and forest trees and field and garden crops studied during 1906–7, an undescribed fungus, *Cytosporella damnosa* n. sp., parasitic on the branches of young pine trees, is described.

Notes on insect and fungus pests (*Jour. Bd. Agr.* [*London*], *17* (*1910*), *No. 6, pp. 478–481, pl. 1*).—After discussing several insect pests of forest trees, attention is called to a black, hardened, gummy substance, which filled the interstices of the bark from an apparently healthy oak some 100 years old. This black substance originated from a gummy degeneration of a fungus mycelium grown on the bark, and partially from similar changes in the tissues of the bark itself.

A bacterial disease of ash bark is also figured and described. This usually occurs when the trees are situated in damp, low places where an excess of moisture causes minute cracks on the stems, which are later enlarged by frost, thus affording an entrance for the bacteria which eventually destroys the wood. The wounds should be cut out when small, and the surface tarred.

The control of scale insects in the British West Indies by means of fungoid parasites, F. W. South (*West Indian Bul., 11* (*1910*), *No. 1, pp. 1–30, pls. 2*).—Technical descriptions are given of *Cephalosporium lecanii*, *Myriangium duriæi*, *Ophionectria coccicola*, and *Sphærostilbe coccophila*, and their distribution throughout the West Indies is indicated.

On the basis of the author's observations and the investigations of others, it appears that under some conditions these fungi can be successfully employed in combating scale insects. The factors which affect the usefulness of these fungi are said to be temperature, wind, and moisture, of which the last two are the most important. Where conditions are suitable this means of controlling scale insects may be depended upon, and only under exceptional circumstances is the use of insecticidal sprays to be recommended.

On the rôle that fluorescent bacteria play in plant diseases, E. Griffon (*Compt. Rend. Acad. Sci.* [*Paris*], *149* (*1909*), *No. 1, pp. 50–53*).—The author claims that *Bacillus fluorescens liquefaciens* and *B. fluorescens putridus* are capable of producing a wet rot or canker of various vegetables, as the former has been found to be the causative agent in a rot of carrots and ruta-bagas, while the anthracnose of tobacco, common in wet years, is attributed to *B. æruginosus*, a synonym, according to the author, of *B. fluorescens putridus*, Tomatoes and melons grown under glass have also been found attacked by a stem canker due to *B. fluorescens*.

It is also stated that *B. caulivorus*, *B. brassicævorus*, and *B. æruginosus* can no longer be held as distinct species but are probably only forms of *B. fluorescens* which under favorable environments easily change from a saprophytic to a parasitic mode of existence.

Prevention of oat and wheat smut, F. L. Stevens (*North Carolina Sta. Bul. 212, pp. 75–84, figs. 2*).—This is a popular discussion of oat and wheat smuts, their nature, cause, infection periods, and methods of prevention.

The formalin treatment is recommended for stinking smut of wheat and oat smut, and the hot-water treatments of Freeman and Johnson (E. S. R., 21, p. 455) for the loose smut of wheat.

Andropogon sorghum (millet or pyaung): Its cultivation and some of its enemies, L. Aubert (*Agr. Jour. India, 5* (*1910*), *No. 3, pp. 222–230, pls. 6*).—In a general discussion of the difficulties attending the growing of this crop in Upper Burma two plant pests are especially noted. One is a white-flowered scrophulariaceous root parasite, *Striga lutea*, which, in times of drought especially, completely destroys entire fields of the millet, and even in years of sufficient rainfall affects both the quality and quantity of the grain produced. The other pest is a bindweed, *Convolvulus arvensis*, which appears annually in

July and August, and by overrunning the millet plants retards their growth and development.

A new chytridiaceous parasite of rye grass, E. GRIFFON and A. MAUBLANC (*Bul. Trimest. Soc. Mycol. France, 26 (1910), No. 3, pp. 317–321, pl. 1*).—The authors describe as new *Cladochytrium cæspitis* n. sp., a fungus which first attacks the sheaths and adjacent tissues of the young stems of rye grass (*Lolium perenne*) near the ground, producing a species of brown rot which soon invades the roots, and finally causes the death of the plants.

Notes on the occurrence of fungus spores on onion seed, G. H. CHAPMAN (*Massachusetts Sta. Rpt. 1909, pt. 1, pp. 164–167*).—In 10 samples of onion seed examined, 2 were found contaminated with onion smut spores (*Urocystis cepulæ*). Spores of onion brown mold (*Macrosporium porri*) and downy mildew (*Peronospora schleideniana*) were also found, as well as the spores of several species of fungi not parasitic on the onion.

Scab and eelworm in potatoes, E. S. HOLMES (*Jour. Dept. Agr. Victoria, 8 (1910), No. 9, pp. 570–582*).—The results are reported of experiments for the prevention of scab and nematodes in potatoes in various parts of Victoria, in which the use of formalin, green and artificial manures, iron sulphate, and spraying for the scab (the term being used here in its widest sense), and the use of green manure, formalin, and spraying for combating the nematode, were tested.

It was found that soaking the seed tubers in a 1:30 solution of formalin for 2 hours before cutting and planting was efficacious in preventing the scab in that form, at least, which occurs in the Ballarat district, while clean seed and artificial manures were also factors in the production of a clean crop. For combating the nematode, green manure and the use of artificial manures, especially the latter, are worthy of consideration for future experiments, while the formalin treatment did not prove as efficacious as in the case of the scab.

A tabulated statement of the results obtained from 5 experimental plats is appended.

The symptoms of internal disease and sprain (streak disease) in potato, A. S. HORNE (*Jour. Agr. Sci., 3 (1910), No. 3, pp. 322–332, pls. 2*).—The author describes the symptoms of two obscure diseases of the potato now found in England. One, known as internal disease, was originally described from Germany by Frank in 1897 (E. S. R., 9, p. 61) as "buntwerden" or "eisenfleckigheit," and the other from England and Scotland called "sprain in potatoes" was described in 1909 (E. S. R., 22, p. 347).

The results are also given of experiments on growing potatoes from seed tubers affected with both diseases, and their subsequent development in storage. As a result of these investigations the author claims that the internal disease attacks certain varieties of potatoes, occurring even in the very young tubers, while sprain, or streak disease, as the author proposes to rename it, occurs in other varieties.

The markings in the diseases may or may not form a connected system in the tissues of the potato. Sometimes the discolored areas are quite isolated, and the diseased cells can easily be traced to within a few cells of the cork layer (skin), terminating occasionally in a slight injury to the surface of the tubers in the case of the streak disease.

No trace of a hyphal organism was found within the cells or intercellular spaces of the diseased tissues. The dead cells often retain their starch in an unaltered condition. Neither disease spreads in storage under the experimental conditions described. In every experiment, samples of potatoes affected with either disease produced a certain proportion of tubers affected with these diseases. Both diseases were frequently found associated with *Phytophthora infestans* in the field and with *Fusarium solani* in storage.

On the causes and methods of combating damping off of the sugar beet, K. Störmer and A. Eichinger (*Fühling's Landw. Ztg., 59 (1910), No. 12, pp. 393–413; abs. in Bl. Zuckerrübenbau, 17 (1910), Nos. 14, pp. 229–234; 15, pp. 245–247*).—The results are given of a large number of experiments on the causes (fungi and crusting of the soil) of the damping off of beet seedlings, on the effect of turf meal, blanching and seed disinfection, condition (physical and chemical) of the soil, and the value of commercial fertilizers in combating the disease.

It was found that three fungi, *Phoma betæ*, *Pythium debaryanum*, and *Aphanomyces lævis*, the first on the seeds and the other two in the soil, are the main causative agents in producing the disease. *P. betæ* apparently dominates during dry springs, while the other two seem more prevalent in wet seasons. The crusting of the soil apparently has no influence on the outbreaks of the disease.

Blanching the seed and seed or soil disinfection had no practical influence in checking the disease, but it was found that the use of lime, phosphoric acid, and either table salt or potash in combination as fertilizers was of the greatest value in controlling it. The addition of these fertilizers to the soil decreased very materially the number of diseased plants, increased the germination, produced a better stand, and resulted in a more vigorous development of the plants left in the field. The table salt especially seemed to have a very favorable effect on the germination of the seed.

The cause of gummosis of tobacco and experiments on its control, J. A. Honing (*Meded. Deli-Proefstat. Medan, 5 (1910), No. 1, pp. 24, fig. 1*).—The results are given of experiments on a disease of tobacco, known as slime disease or gummosis, due, it is claimed, to bacteria which live in the soil and which infect first the roots, then the stems and leaves, and finally kill the plant.

It was found that the rotting stems of diseased tobacco plants, when mixed in the soil around living plants, produced the disease. Also, various experiments in infecting the holes for the plants and the roots of the plants, by spraying with dilute culture solutions of the bacteria, and the roots, stems, and leaves of plants by inoculation with bouillon cultures through punctures, showed abundant evidence of infection by each method, although the soil infection was slower in developing the disease than when the bacteria was introduced directly into the plants through punctures.

Experiments on the probable relationship of various wild plants as propagators of this disease are also reported, in which apparently a species of stinging nettle and an Ageratum are capable of acting as carriers.

Experiments in soil disinfection as a means of combating this disease were tried with calcium chlorid, potassium permanganate, copper sulphate, and formalin, from which it seems that either the chlorid of lime, from 2 to $2\frac{1}{2}$ gm. in from $1\frac{1}{2}$ to 2 liters of water per plant, put in each hole just before the plants are set out, or the same amount of potassium permanganate per plant, may prove of value in reducing the number of diseased plants.

Formalin also gave excellent results when used at the rate of 2 liters of a 1 per cent solution to each hole, but its excessive cost prohibits its general use as a field remedy against this disease.

Control of certain greenhouse diseases, G. E. Stone (*Massachusetts Sta. Rpt. 1909, pt. 2, pp. 48–54*).—It is claimed that experiments covering a period of several years have demonstrated that by proper regulation of the moisture in well-ventilated hothouses, anthracnose, downy mildew, Alternaria, and powdery mildew of cucumbers and melons can be absolutely controlled. The common greenhouse diseases of tomatoes, lettuce, chrysanthemums, and carnations can also be controlled if the proper moisture, heat, and light conditions are present.

Malnutrition, G. E. STONE (*Massachusetts Sta. Rpt. 1909, pt. 1, pp. 154–162*).—Several cases of malnutrition in plants are recorded, due principally, it is claimed, to injudicious use of commercial fertilizers, especially in greenhouses.

Malnutrition in cucumbers grown under glass is very common, and is characterized by a rolling of the foliage producing a convexity of the upper surface of the leaf, while the margins of the leaf are usually slightly burned or dead. The addition of pig, cow, hen, and sheep manures, nitrate of soda, or other concentrated fertilizers to an already sufficiently fertile soil is claimed to be the cause of the malnutrition.

Calico or mosaic disease of cucumber and melon, G. E. STONE (*Massachusetts Sta. Rpt. 1909, pt. 1, p. 163*).—Attention is called to the occurrence of this disease in cucumbers and melons grown under glass. The trouble is characterized by a mottled appearance of the foliage, and the whole plant appears abnormal.

A similar spotting and mottling occurred on pruned tomato plants.

Field studies of the crown gall and hairy root of the apple tree, G. G. HEDGCOCK (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 186, pp. 108, pls. 10*).—The results are reported of several years of investigation and experiments on crown gall and hairy root, including descriptions of their different forms, their probable relations, their development, their effects on apple trees, the susceptibility of different varieties, infection in the nursery and orchard, and means of control.

As a result of these investigations it was found that crown gall and hairy root occur in nurseries and orchards throughout the apple growing regions of the United States, and has been reported in Europe, South Africa, New Zealand, and Australia. There are two forms of the crown gall on apple trees, the soft and the hard. A similar crown gall is also found on the almond, apricot, blackberry, cherry, chestnut, grape, peach, pear, plum, prune, raspberry, rose, and walnut.

The hairy-root type of the disease may occur in four forms, as follows: The simple form, characterized by numerous roots springing at right angles from a large root; the woolly-knot form, composed of numerous more or less parallel roots springing from a hard gall on a longer root; broom root, a side root with much fasciated, fine branch roots, often negatively geotropic; and aerial galls, which are the woolly-knot form on the limbs of the trees. All these forms of hairy root are probably directly related to the forms of crown gall.

The soft form of the crown gall is most common on yearling apple seedlings, and is occasionally found on budded and root-grafted trees. The hard form is common on budded trees, and much more abundant on root-grafted ones. Hairy root of the simple form is frequent on apple seedlings and on budded and root-grafted trees, while the woolly-knot form is the most common form of the disease, especially on 3-year-old root-grafted trees in the nursery and on orchard trees.

Crown gall gains entrance almost entirely through wounds. Heavy, stiff, clayey, wet soils apparently increase the amount of crown gall, especially in nursery stock.

Orchard experiments indicate that older apple trees in many cases successfully resist both hairy root and crown gall, and that many may completely recover. Experiments also indicate that the effect of crown gall and hairy root upon apple trees in the orchard has been overrated, at least in the established apple regions of the Central and Eastern States.

The period when most apple root grafts become diseased with crown gall is when the wounds in the union are being healed by the formation of callus. The disease apparently does not spread from tree to tree in the nursery rows, since there was little or no increase of disease after the first year. Root grafts should be carefully fitted, especially with respect to the lower end of the scion, which should have a sharp rather than a blunt end. The wrapping used should cover the union completely and should firmly hold the parts together until the graft is planted in the soil, and then should rot away when growth begins.

Crown gall and hairy root of apple trees is principally a nursery disease, gaining entrance most frequently during the first year. In order to keep the nursery as free as possible from it, all diseased trees should be left in the field at the time of digging, and burned as soon as dry. Scions from healthy trees and stocks from seed from sound trees only should be used. Root grafts should preferably be stored in sand, and if the period of planting is delayed beyond two weeks, they should be stored at a temperature a few degrees above the freezing point. Such varieties as the Wealthy, Yellow Transparent, Wolf River, Ben Davis, and Northern Spy, which are quite susceptible to crown gall and hairy root, should be propagated by budding. Growers of seedlings should avoid wounding the young trees during cultivation.

A bibliography is appended.

Some obscure diseases of the peach, J. B. S. Norton (*Jour. Econ. Ent., 3 (1910), No. 2, pp. 228–236*).—The author briefly describes a number of diseases of the peach, the exact cause of which is not known or that are of unusual occurrence. Among those described are yellows, rosette, little peach, silver leaf, split pit, root rot, gummosis, canker, shot hole, leaf spot, chlorisis, leaf roll, wilt, leaf and fruit drop, twig spot, and twig blight.

Little peach disease, L. Caesar (*Ontario Dept. Agr. Bul. 185, pp. 8*).—The author summarizes the known facts about little peach, compares its symptoms with those of peach yellows, discusses little peach and its ravages in Michigan, and closes with recommendations to Ontario orchardists concerning its control.

Persistent and careful yearly inspection looking to its complete eradication by the prompt destruction of all infected trees is the only remedy advised.

Experiments with nitrate of silver in combating the grape mildew, Labergerie (*Jour. Agr. Prat., n. ser., 20 (1910), No. 38, pp. 369, 370*).—In testing the efficiency of this new silver spray (E. S. R., 24, p. 51) in combating the mildew, two varieties of grapes, one very susceptible and the other fairly resistant to its attack, were used. Both plats received 4 applications of Bordeaux mixture previous to spraying with the silver nitrate solution, and the results were compared with those obtained with the regular Bordeaux mixture.

The silver nitrate in neither case proved effective against the mildew, showing a marked inferiority to the Bordeaux mixture in this respect.

A bacterial disease of bananas and plantains, J. B. Rorer (In *Proc. Agr. Soc. Trinidad and Tobago, 10 (1910), No. 4*).—The author describes a disease of bananas and plantains which has become rather destructive in Trinidad. The disease is characterized by the drooping of the leaves, and sections of the midribs of the leaf and of the stem showed the fibrovascular bundles blackened and filled with bacteria.

An examination of a large amount of material led the author to conclude that the disease was a bacterial one, and an attempt was made to isolate the causative organism. Two organisms were found, one of which was a rapid gas former in beef agar, while the other made a rather slow growth in all the media in which it was tried. Inoculation experiments showed that the gas-forming organism did not cause the disease, while in inoculations with the other species the typical symptoms were produced, and the organism was reisolated.

Attention is called to diseases of bananas in other regions, and while it is not definitely claimed that they are identical, such seems to be the indication.

The specific organism has not yet been fully identified, and further investigations upon it are in progress.

On the blackening of the seeds of cacao, caused by an Acrostalagmus, F. Guéguen (*Bul. Trimest. Soc. Mycol. France, 26 (1910), No. 3, pp. 287–297, pls. 2*).—A disease of cacao beans is reported from the Island of St. Thomas, in which the beans while still in the pods on the trees are covered by a black growth of the hyphal threads of a fungus, *Acrostalagmus vilmorinii thomensis* n. var., a technical description of which is given.

It is claimed that the fungus is introduced into the pods through the punctures of a wood-boring insect, *Xyleborus perforans*, and the preventive measure recommended is the destruction of the beetles by the use of insecticide sprays.

A new West Indian cacao pod disease, C. K. Bancroft (*West Indian Bul., 11 (1910), No. 1, pp. 34, 35, pl. 1*).—A description is given of *Colletotrichum cradwickii* n. sp., a fungus recently observed on samples of diseased cacao pods received from Jamaica. The parasitism of the fungus remains to be established.

Report on the outbreak of blister blight on tea in the Darjeeling District in 1908–9, W. McRae (*Agr. Research Inst. Pusa [India], Bul. 18, 1910, pp. 19, pls. 6*).—This is a more extended discussion of the outbreak of blister blight on tea, previously reported from another source (E. S. R., 23, p. 749), including a more detailed description of the gross and microscopic characteristics of the fungus, additional data as to damage done, and the probable source of introduction into this district.

Damages caused by Lophodermium macrosporum, E. Mer (*Bul. Soc. Nat. Agr. France, 70 (1910), No. 7, pp. 652–660*).—Attention is called to the damage done by this leaf cast fungus, especially under certain environments, when the trees may be completely defoliated; this may occur in nurseries or in dense thickets of young trees from 15 to 25 years of age. The remedies recommended are the use of copper sprays, the spreading of nitrate of soda between the rows of trees, and setting the plants farther apart in the nursery.

A biological study of Sterigmatocystis quercina, A. Sartory (*Bul. Trimest. Soc. Mycol. France, 26 (1910), No. 3, pp. 349–357, fig. 1*).—The results are given of studies of the sclerotia, microscopic structure, and growth of the fungus on liquid and solid media. It was found that *S. quercina* was able to grow on all the usual media employed for bacteriological cultures, and formed sclerotia on potatoes and carrots.

A leaf parasite of Quercus ilex, H. T. Güssow (*Jour. Bot. [London], 46 (1908), No. 544, p. 123, figs. 4; abs. in Centbl. Bakt. [etc.], 2. Abt., 27 (1910), No. 22–25, p. 653*).—A technical description is given of a new leaf-spot fungus, *Ascochyta quercus-ilicis* n. sp., which forms irregular spots on the leaves of this oak.

A study on the black canker of the chestnut, V. Ducomet (*Ann. École Nat. Agr. Rennes, 3 (1909), pp. 1–70, figs. 40*).—After a brief review of the history of the disease and of various fungi claimed by different investigators as its cause, the author discusses with much detail the various mycorrhizal fungi associated with the roots of the diseased chestnuts.

As a result of these investigations it is claimed that the disease is due to three different agencies, viz, (1) a mycorrhizal fungus which has become parasitic on the roots, (2) a filamentous chytridiaceous fungus introduced by the mycelium of the parasitic mycorrhiza, and (3) bacteria in the mycorrhizal regions of the roots, introduced either directly by the normal or parasitic mycorrhizal mycelium, or by the mycelium of the chytridiaceous fungus.

Note on the chestnut fungus, W. T. DAVIS (*Proc. Staten Isl. Assoc. Arts and Sci., 2 (1908–9), No. 3, pp. 128, 129*).—In discussing the dissemination of the chestnut fungus (*Diaporthe parasitica*), attention is called to the presence on a diseased tree of slender, thread-like gelatinous masses of spores 0.25 of an inch in length which hang from the bark near the ground, and are usually not so commonly noticed as the simple pustules on the bark.

The tree was also attacked by a wood-boring beetle (*Neoclytus erythrocephalus*), which may aid in distributing the spores from tree to tree.

Note on the Oïdium of the Japanese euonymus, E. FOEX (*Bul. Trimest. Soc. Mycol. France, 26 (1910), No. 3, pp. 322–326, pl. 1*).—The author discusses the characteristics of the mycelium and the chemical nature and function of certain thickenings found on the mycelium of this Oïdium. These mycelial incrassations gave some of the reactions for callose, and also for cellulose, but seemed to be neither.

Sun scorch of the pine, G. E. STONE (*Massachusetts Sta. Rpt. 1909, pt. 2, pp. 65–69*).—The author claims that a species of pine blight characterized by a burning of the needles so severe in some cases as to cause the death of the trees, is due to sun scorch and not to any fungus or bacterial agency.

This burning of the pine foliage is most severe in hot, windy weather, and is associated with a very dry condition of the soil. An examination of the root system showed that in some cases about 90 per cent of the small feeding roots and mycorrhiza had collapsed, thus producing the scorching or blighting of the foliage. Later, under favorable conditions of moisture, the affected trees may put forth a new growth of foliage and finally fully recover.

Root infection of Trametes pini, A. HAFIZ (*Indian Forester, 36 (1910), No. 10, pp. 559–562, pls. 2*).—Attention is called to the infection by this fungus of healthy roots of the blue pine (*Pinus excelsa*), when by contact they had become fused with the diseased roots of pine trees dying with ring scale (*T. pini*).

On examination, several cases of such fusion showed not only the hyphæ of the fungus present in the tissues of the fused portion of the roots of healthy trees, but also instances in which the root system of an apparently healthy tree was thus diseased, while the trunk and limbs were still free from hyphæ.

The author claims, therefore, that without doubt infection by *T. pini* may occur underground when the roots of diseased trees come into contact with healthy ones.

The diseases of Azalea indica, J. HARTMANN (*Gartenwelt, 14 (1910), No. 19, pp. 217–220, figs. 4*).—The author discusses (1) two inorganic diseases of this ornamental plant, a stem rot probably due to frost, and injuries caused by the use of too much lime; (2) insect pests, plant lice (*Aleurodes vaporiariorum*), and a leaf roller (*Acalla schalleriana*); and (3) fungus diseases, leaf spot (*Septoria azaleæ*), and a gall-forming Exobasidium which is very injurious to *A. indica*, but as yet is not found on the native azaleas. The destruction of the diseased limbs and spraying with a 1½ per cent solution of copper sulphate are recommended as remedies for this last-named disease.

A new gall-forming fungus on Zizyphus from the Transvaal, P. MAGNUS (*Ber. Deut. Bot. Gesell., 28 (1910), No. 7, pp. 377–380, pl. 1*).—A fungus parasite which forms ovoid to spheroid galls from 3 to 10 mm. in diameter on the petioles and stems of *Zizyphus* sp. is described as the type of a new genus and species, *Hyalodema evansii.*

Spraying experiments with calcium benzoate, G. E. STONE (*Massachusetts Sta. Rpt. 1909, pt. 2, pp. 55, 56*).—Negative results are reported in controlling plum rot (Monilia) with a 2:50 solution of calcium benzoate sprayed on the trees when laden with fruit.

Spraying injuries, G. E. Stone (*Massachusetts Sta. Rpt. 1909, pt. 2, pp. 46, 47*).—Attention is called to the noticeable injury during 1909 to apple foliage and fruit from spraying with Bordeaux mixture, and also to foliage burning from arsenate of lead spray, especially on plum trees, but also on maple and beech trees.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

The California ground squirrel, C. H. Merriam (*U. S. Dept. Agr., Bur. Biol. Survey Circ. 76, pp. 15, figs. 4*).—This is a more detailed account than that previously noted (E. S. R., 21, p. 153).

The California ground squirrel, *Citellus beecheyi*, also known as the Digger, or Beechey ground squirrel, which is of particular importance because of its rôle in the spread of bubonic plague, ranges from Lassen Butte and Susanville in northeastern California southward, east of the Sacramento Valley to San Francisco Bay, and south of the bay overspreads practically the entire State and pushes southward into the peninsula of Lower California, avoiding only the higher mountains and the more arid deserts. Its subspecies *fisheri* inhabits Kern and Owens valleys, the borders of the Mohave Desert, the upper parts of San Gorgonio Pass, and other localities in southern California, and occurs as far east as the Coso, Argus, and Panamint mountains. The Douglas ground squirrel (*C. douglasi*), which ranges from the north side of San Francisco Bay northward to Columbia River, and the Rocky Mountain or Plateau ground squirrel (*C. grammurus*), which in California is known only on the east side of the Mohave Desert, are closely related species.

The life history, habits, food, distribution, etc., of the California ground squirrel are described. It is stated that more than 387 of these squirrels were found in California infected with bubonic plague during the past year. The means of destruction are considered under the headings of trapping, poisoning, and fumigation.

"In places where ground squirrels are abundant over considerable areas the simplest, most effective, and least expensive way to destroy them is by the use of grain poisoned with strychnin. Phosphorus and cyanid of potassium, owing to the great danger attending their use, are not recommended, especially since they are not more effective than strychnin." Coated grain, except during the rainy season, gives far better results than soaked grain and kills the animals more quickly so that they are much more likely to die above ground where they can be seen. The formula perfected and recommended by the Biological Survey, which consists of 20 qt. of clean barley, 1 oz. strychnia sulphate, 1 teaspoonful of saccharin, ½ teacupful of starch, and 1½ pt. of water, is prepared in the following manner: "Dissolve the starch in a little cold water and add 1½ pt. of boiling water, making a rather thick solution. While hot, stir in the strychnin and mix until free from lumps; then add the saccharin and beat thoroughly. Now pour the poisoned starch over the barley and stir rapidly until the poison is evenly distributed; then allow the grain to dry. When dry it will keep indefinitely without deterioration. . . .

"The most economical method is first to use the starch-strychnin preparation, and later to kill the few remaining animals by using bisulphid of carbon in the burrows that are still occupied. The cost of barley coated with the starch-strychnin preparation varies from about $4 to $4.75 per 100 lbs., . . . and 100 lbs. of the poisoned grain is sufficient to treat from 200 to 300 acres, according to the abundance of the squirrels."

Detailed directions for winter poisoning are also given. It is claimed that the methods recommended are not dangerous to stock, but should not be practiced in places accessible to poultry.

The pocket gopher, T. H. Scheffer (*Kansas Sta. Bul. 172, pp. 197–233, figs. 14*).—This is a revision of Bulletin 152, previously noted (E. S. R., 19, p. 1156).

Catalogue of Canadian birds, J. and J. M. Macoun (*Ottawa: Geol. Survey Canada, 1909, pp. VI+761+XVIII*).—In the present edition (E. S. R., 16, p. 543) much of the matter has been rewritten, many additional facts recorded, and the whole combined into one volume.

In compiling the catalogue, the authors have attempted to bring together facts on the range and nesting habits of all birds known to reside in, migrate to or visit, the northern part of the continent. In addition to the Dominion of Canada they have included Newfoundland, Greenland, and Alaska. The nomenclature and the numbers given in the latest edition and supplements of the A. O. U. check-list published have been made the basis of arrangement.

A manual of Philippine birds, R. C. McGregor (*Manila: Bur. Sci., 1909, pt. 2, pp. XVI+431–769*).—This second part of the work previously noted (E. S. R., 22, p. 353) takes up the order Passeriformes. It is stated that this order includes nearly as many species, among Philippine birds, as all the other orders combined.

Zoological yearbook, 1909, P. Mayer (*Zool. Jahresber., 1909, pp. VIII+247+33*).—Bibliographical lists are given and summaries of the more important literature issued during 1909 relating to the various groups of the animal kingdom.

Report of the International Commission on Zoological Nomenclature, C. W. Stiles (*Science, n. ser., 32 (1910), No. 830, pp. 764–767*).—This brief report includes by-laws adopted by the Commission and amendments to the international rules of zoological nomenclature recommended to the Congress.

Report of the entomologists, C. H. and H. T. Fernald and J. N. Summers (*Massachusetts Sta. Rpt. 1909, pt. 1, pp. 73–76*).—A brief account is given of the progress of investigations under way.

It is stated that the experiments for the control of the onion thrips have proceeded far enough to show that spraying the onions after this pest has appeared on them is, at best, only a partial remedy. "A study of the life history of these insects shows that they pass the winter at the top of the ground in protected places, such as are furnished by dead grass around the onion fields, in rubbish heaps and similar places; and a few attempts to destroy them by burning over the grass and rubbish around the fields have been followed by a reduction in the abundance of the insect the next spring."

In speaking of the influence of climatic conditions upon the northern distribution of several injurious insects, it is said that for at least one the limits will probably be found within the State. The evidence now available "suggests the belief that in Massachusetts the elm-leaf beetle will not be likely to be of much importance in those parts of the State that are more than a thousand feet above sea level, except perhaps, in the southern edge of the State, where the altitude is to some extent offset by the more southern latitude."

Insects of the year, H. T. Fernald (*Massachusetts Sta. Rpt. 1909, pt. 2, pp. 70–73*).—A brief report of the more abundant insect pests of 1909.

An outline is given of the history in Massachusetts of the elm-leaf beetle, which for several years has been increasing in abundance and attracting more attention. The San José scale is becoming more abundant in orchards and on ornamental shrubs and trees and in some cases is found in wooded areas. The leopard moth (*Zeuzera pyrina*) which has increased in abundance in the region around Boston is another menace to shade trees. The gipsy moth has also increased and the brown-tail moth is spreading in the State, nests having been found as far west as Brookfield and Belchertown. The 12-spotted asparagus beetle (*Crioceris 12-punctata*) has been found fairly abundant at Concord and

Roslindale, but as yet has not been reported from the Connecticut Valley. It is said that the chalcidid parasite *Tetrastichus asparagi*, which deposits its eggs in the eggs of the common asparagus beetle, has 2 and probably 3 broods a year, corresponding to those of the asparagus beetle, and that, judging from its work during the summer under report, it promises to be quite effective in controlling this pest.

Seventh annual report of the state entomologist of Montana, R. A. COOLEY (*Montana Sta. Bul. 79, pp. 52–58*).—In addition to a financial statement and other data, brief mention is made of the entomological features of the year. The pests thus mentioned are the green fruit worm (*Xylina* sp.), tussock moth (*Notolophus antiqua*), buffalo tree-hopper, pear-leaf blister-mite, onion maggot, bronze apple-tree borer, and scale on mountain ash (*Aspidiotus* sp.).

[Monthly bulletin of the division of zoology], H. A. SURFACE (*Zool. Bul. Penn. Dept. Agr., 7 (1910), Nos. 9, pp. 263–291; 10, pp. 295–322; 11–12, pp. 325–368, pls. 3*).—These numbers contain reports of Pennsylvania orchard inspectors, work in demonstration orchards, bee-keeping, a nursery inspection report, and an index to volume 7.

Report of the entomologist [of Trinidad], F. W. URICH (*Bul. Dept. Agr. Trinidad, 9 (1910), No. 65, pp. 160–163*).—In this report notes are presented on the insects of importance during the year ended March 31, 1910.

Froghoppers (*Tomaspis postica*), the giant moth borer (*Castnia licus*), and the small moth borer (*Diatræa saccharalis*) were the chief pests of sugar cane. Others observed during the year were the striped grass looper (*Remigia repanda*), the gru-gru beetle (*Rynchophorus palmarum*), and the small beetle borer (*Sphenophorus piceus*).

The cocoa beetle (*Steirastoma depressum*) was the most serious pest in cocoa fields. The leaf hopper (*Horiola arquata*) was the most important of the insects affecting the flowers and young pods. *Heliothrips rubrocinctus*, while seldom absent from the cocoa estates, did only occasional damage.

In an investigation of complaints received that beetles were attacking and destroying coconut palms, it was found that "in dead or dying palms still standing, larvæ of the bearded weevil (*Rhina barbirostris*) were plentiful and trees that had been recently felled attracted large numbers of the gru-gru beetle (*R. palmarum*). At Mayaro a species of Sphenophorus was found attacking a tree that was affected by root disease. *Xyleborus perforans* was also found on diseased palms. In the Cedros district the adult of a rhinocerus beetle (*Oryctes* sp.) destroyed young coconut plants by burrowing into them from beneath and damaging the internal soft tissues." Three species of scale insects, *Vinsonia stellifera*, *Aspidiotus destructor*, and *Icerya montserratensis* were observed in small numbers on coconut palms.

The young nymphs of the giant locust (*Tropidacris dux*) made their appearance in one district in swarms at the opening of the rainy season; it was determined that their nymphal period lasted from May to July.

Notes on some insect enemies in Tobago, P. L. GUPPY (*Bul. Dept. Agr. Trinidad, 9 (1910), No. 65, pp. 135–139*).—The insects noted include the cotton stainer, tobacco hornworm, tobacco bud worm, castilloa blight due to attacks of the "Akee" fringed scale (*Asterolecanium pustulans*), cocoa thrips, tobacco flea beetle, and mealy bugs.

Report of superintendent of entomology, E. M. EHRHORN (*Hawaii. Forester and Agr., 7 (1910), No. 11, pp. 336–338*).—The Mediterranean fruit fly *Ceratitis capitata* is reported to have appeared in Hawaii on the Island of Oahu. It is stated that the pest must have been in the islands at least 2 years, if not longer. The mandarin orange, lime, and common seedling orange are reported to be attacked quite severely, while the navel orange is only slightly attacked. It is recommended that a regulation be passed prohibiting the shipping of Oahu grown fruit to the other islands.

Annual report on the entomological work for the year 1909, C. W. JEMMETT (*Ann. Rpt. Ent. Work [South. Nigeria], 1909, pp. 20*).—A brief account is given of the work of the year to which are appended two reports, namely, On Insects Observed on the Cotton Plant During the Year, 1909 (pp. 9–15), and On Insects Observed on Cocoa Trees During the Year, 1909 (pp. 16–20).

Insects which kill forest trees: Character and extent of their depredations and methods of control, A. D. HOPKINS (*U. S. Dept. Agr., Bur. Ent. Circ. 125, pp. 9*).—This circular consists of revised extracts from Bulletin 58, Part 5, of the Bureau of Entomology, previously noted (E. S. R., 22, p. 260).

Insect injuries to the wood of living trees, A. D. HOPKINS (*U. S. Dept. Agr., Bur. Ent. Circ. 126, pp. 4*).—This also consists of revised extracts from Bulletin 58, Part 5, of the Bureau of Entomology (E. S. R., 22, p. 260).

Insect injuries to the wood of dying and dead trees, A. D. HOPKINS (*U. S. Dept. Agr., Bur. Ent. Circ. 127, pp. 3*).—This also consists of revised extracts from Bulletin 58, Part 5, of the Bureau of Entomology (E. S. R., 22, p. 260).

Insect injuries to forest products, A. D. HOPKINS (*U. S. Dept. Agr., Bur. Ent. Circ. 128, pp. 9*).—This also consists of revised extracts from Bulletin 58, Part 5, of the Bureau of Entomology (E. S. R., 20, p. 260).

Insects in their relation to the reduction of future supplies of timber, and general principles of control, A. D. HOPKINS (*U. S. Dept. Agr., Bur. Ent. Circ. 129, pp. 10*).—This also consists of revised extracts from Bulletin 58, Part 5, of the Bureau of Entomology (E. S. R., 22, p. 260).

Papers on deciduous fruit insects and insecticides. Life history of the codling moth in northwestern Pennsylvania, A. G. HAMMAR (*U. S. Dept. Agr., Bur. Ent. Bul. 80, pt. 6, pp. 71–111, pl. 1, figs. 15*).—The account here presented is based upon investigations conducted at North East, Pa., from 1907 to 1909. Seasonal history studies of these years, in which the separate stages of the 2 generations are considered in detail, are followed by a comparison of life history studies for the 3 seasons in which certain fluctuations were found in regard to the time of emergence of moths and the time of maturity of larvæ of the 2 broods, and also a comparison of relative occurrence of larvæ of the 2 broods for the 3 seasons. Many tables and charts accompany the account, the maximum and minimum daily temperatures for the 3 years being shown in the form of charts. Brief mention is made of the several insect enemies observed, which include *Tenebrioides corticalis*, found to devour codling moth larvæ, 4 species of ants attacking the larvæ, a hymenopterous parasite (*Ascogaster carpocapsæ*) bred commonly from band material of the 2 broods, and others.

The following summary of the work is given:

"In northwestern Pennsylvania the codling moth produces in the course of a year one full generation and a partial second generation.

"The life-cycle of the insect may be briefly summarized as follows: In the spring the overwintering larva pupates in early June, and 3 weeks later the moth emerges. The emergence extends over a period of about 1 month, beginning about the middle of June. Oviposition generally takes place 3 or 4 days after the emergence of the moth, and the egg hatches in 1 week. Eggs showing a red ring are about 3 days old, while those with a black spot in the center will mostly hatch in 1 or 2 days. Shortly after hatching the young larva enters the fruit and feeds about 26 days. On reaching maturity the larva seeks a hiding place beneath the rough bark of the trunk of the tree and constructs a cocoon within which pupation takes place about 1 week after the larva left the fruit. Some of the larvæ do not pupate at this time but winter, and the moths emerge the following spring, together with moths from second-brood larvæ. The pupal stage—called the first-brood pupæ, though the second set of pupæ of the season—lasts on an average 12 days. The emergence period of this second set of moths, called first-brood moths, begins in early August and lasts about 1 month. With the appearance of new eggs, resulting from the first-brood moths, the life-cycle of the first generation is completed, covering on an average 58 days. The second-brood eggs hatch generally within 9 days and the resulting larvæ feed about 40 days, after which they enter hibernation, making cocoons beneath the rough bark on the trunk of the trees. The life-cycle of the second generation and part of the first generation is first completed with the transformation of the insect the following spring. . . .

"The relative number of transforming larvæ of the first brood is variable under different seasonal conditions. The relative abundance of second-brood larvæ depends more upon seasonal conditions and food supply than upon the number of transforming larvæ of the first brood. Larvæ of the second brood are always present in injurious numbers, so that measures should be taken to combat the second as well as the first brood.

"The time of the emergence of the spring brood of the moths is variable under different seasonal conditions and depends largely upon the relative lateness of the spring. The time of emergence of the summer brood or first brood of moths is fairly constant and generally commences about the 1st of August.

"In the control of the codling moth with poison sprays three applications should be made in this section of the country. The first application should be made after the blossom period just after the petals drop, the second application 8 to 10 days later, and the third application about the 1st of August."

Codling moth in the Hudson Valley, E. P. Felt (*Country Gent., 75 (1910), No. 3020, p. 1174, fig. 1*).—A brief report is given of spraying experiments in two orchards, one located at Arlington and the other at Washingtonville, N. Y.

The data secured in 1910 show that it is possible in the Hudson Valley, with but one spraying, to obtain over 90 per cent of sound fruit in a year when the codling moth is very abundant, even on trees yielding only from 300 to 500 apples. An examination of wormy fruit showed that from 50 to 60 per cent of the larvæ had entered at points injured on May 30 by hail. "Cacœcia larvæ were rather numerous in one orchard, and their operations were frequently followed by codling moth larvæ entering at such places. Badly rusted, rough spots on the fruit were also favorite points of attack. Comparative freedom from codling moth injury was observable in orchards where pigs or sheep had been allowed to run, this being especially true if the animals had been pastured in the orchards for several years, even in those where there was no spraying."

A comparison made of Bordeaux mixture and lime sulphur wash showed a striking contrast in favor of the latter as a fungicide.

Some miscellaneous results of the work of the Bureau of Entomology.—IX, The pecan cigar case-bearer, H. M. Russell (*U. S. Dept. Agr., Bur. Ent. Bul. 64, pt. 10, pp. 79–86, pls. 3, figs. 2*).—Studies of *Coleophora caryæfoliella*, made at Orlando, Fla., during the spring of 1909 are presented.

While this pest of the pecan is one of minor importance, at times it occurs in sufficiently large numbers to defoliate entire trees. The species was first described in 1861 from larvæ found feeding in their cases on leaves of hickory during the fall. Records of capture and injury indicate that it is distributed throughout the Austroriparian faunal area of the United States and may also extend into the Carolinian and into the lower edge of the Alleghanian area. It feeds principally on nut-bearing trees, having been observed upon walnut, pecan, and hickory, with doubtful records on dogwood and *Prunus americana*. Its injury to the pecan occurs in early spring through feeding on buds and unfolding leaves. Technical descriptions of its several stages are presented.

The moths emerge from the pupæ during May and June and at that time may be found among the pecan trees. The larvæ hatch out in July, mine the leaves of the host plant, and after feeding there for some time cut out the 2 skins of the mine and construct the cases within which they live during the fall and winter. After the cases are made the larvæ feed upon the leaves by eating through the lower epidermis and tunnelling out the interior of the leaf in all directions. When the mine becomes so large that to mine further the larvæ would have to leave their cases, they move and begin a new mine, so that the leaves become full of irregular rectangular patches of brown with a small round hole in the center on the underside. In October, before the leaves fall, these larvæ move from the leaves to the twigs or to the trunk, where they get behind the bark, and between the bud and the twig. Here they fasten the cases to the support and hibernate.

Upon becoming active in the spring, the larvæ commence to feed, often before the leaves have developed. In such cases each larva eats a minute round hole into a bud and feeds as long as it can reach food without leaving its small case. When this becomes impossible the larva changes position and attacks the bud in a new place, so that infested buds are often found with 4 or 5 holes in the sides. Under such treatment the buds are killed or the tiny leaves start and are killed, and turning brown drop off. Often the larvæ attack the young tender leaves and mine out rectangular blotches in them. About the first week in April these larvæ outgrow their winter cases, construct larger ones, move to the edge of the leaf and mine between the 2 skins. During May most of the larvæ become mature and then either fasten the case tightly to the leaves and pupate or move to twigs, branches, or bits of bark on the trunk of the tree and fasten the cases there. After remaining quiet for a number of days the pupæ are formed. As far as observed, this insect has only one brood during the year, the larvæ hibernating when only partially grown.

It is thought that this insect can be controlled by spraying the trees with arsenate of lead at the rate of 3 lbs. to 50 gals. of water when the buds are swelling. When the larvæ attack the foliage, this should be similarly sprayed.

The bibliographical list given consists of 8 references.

The moths of the British Isles, R. South (*London and New York, 1907, Ser. 1, pp. VI+343, pls. 159, figs. 23; 1908, Ser. 2, pp. VI+376, pls. 159, figs. 20*).—The first of these two volumes takes up the families Sphingidæ and Noctuidæ and the second the families Noctuidæ and Hepialidæ. Colored figures are given of every species and many varieties, also drawings of eggs, caterpillars, chrysalids, and food plants.

More than 2,000 moth species are known to occur in these islands. "The majority assume the moth condition but once in the year, but some species have 2, or even 3, generations in the 12 months, while others occupy 24 months in completing the life cycle. In one or two species the chrysalis stage may last 4, 5, or even 6 years."

The type species of the North American genera of Diptera, D. W. Coquillett (*Proc. U. S. Nat. Mus., 37 (1910), pp. 499–622*).—This paper embodies work extending over a period of several years. The rules adopted by the International Zoological Congress, as amended at the 1907 (Boston) meeting and the later decisions as published elsewhere [a] are said to have been followed in all cases.

Mosquito extermination (*Ann. Rpt. Bd. Health N. Y. City, 1 (1908), pp. 128–185, pls. 15, maps 8*).—A report of the occurrence of mosquitoes and the work being conducted against them around the city of New York.

Culex pipiens, *C. pungens* and species of Anopheles and Psophora are those commonly found in inland deposits of fresh water around New York City. The so-called "striped legged" mosquito (*C. sollicitans*), which breeds exclusively in salt marshes, is said to constitute three-fourths of the mosquitoes found on Staten Island. During the period from April 1, 1908, to January 1, 1909, $440.90 were spent by the city and $17,051.96 by property owners in digging trenches to remove standing water, a total of 39,284.37 cu. yds. of material being removed.

The Coleoptera or beetles of Indiana, W. S. BLATCHLEY (*Ind. Dept. Geol. and Nat. Resources Bul. 1, pp. 1386, figs. 590, map 1; rev. in Science, n. ser., 32 (1910), No. 832, pp. 838–840*).—In this work the author describes 2,535 species of beetles, exclusive of the Rhynchophora, that are known to have been taken in Indiana and in addition 777 that have a known range which renders it probable that they may also occur within the State. Tables for the separation of genera and species are included.

The review is by F. Knab.

Preliminary studies on the biology of the bedbug, Cimex lectularius. I. The effect of quantitatively controlled food supply on development, A. A. GIRAULT (*Jour. Econ. Biol., 5 (1910), No. 3, pp. 88–91*).—In this paper the author reports in tabular form the results of a study made to show how an approximately quantitatively controlled food supply affects the development of *C. lectularius*.

Four individuals (3 females and 1 male) which were given an optimum and normal food supply, all passed 5 ecdyses; they averaged 8.75 meals, and required an average of 69.9 days for the completion of their life cycles. One female from a lot of 5 individuals (2 males, 2 females and one not stated), whose food supply was below the optimum, and thus abnormal, molted a sixth time; the average number of meals for the lot was 18.75, the average duration of the life cycle being 139.09 days. In a third lot of 2 males with an optimum food supply 5 molts were passed, both engorging 5 times and requiring approximately 70 days for their cycle of development. One of 2 males that were given a half or below optimum food supply passed a sixth molt; both fed 9 times, 1 requiring nearly 118 days and the other 116 days for the completion of their development. It thus appears that the reduced quantity of food did not affect reproduction or sex, but lengthened the cycle indefinitely, reduced their size, and increased the average number of ecdyses.

The Coccidæ of Ceylon, E. E. GREEN (*London, 1909, pt. 4, pp. 251–344, pls. 39*).—This fourth part of the work previously noted (E. S. R., 15, p. 880) includes descriptions of new species representing the following genera of the subfamilies Lecaniinæ and Asterolecaniinæ: Neolecanium (1), Protopulvinaria (1), Ceronema (1), Pulvinaria (3), Inglisia (1), Ceroplastodes (2), Aclerda (1), Lecaniodiaspis (2), Cerococcus (3), Asterolecanium (11), and Pollinia (1).

Filariæ in Ixodes, V. BALDASSERONI (*Bul. Soc. Ent. Ital., 40 (1909), pp. 171–174; abs. in Jour. Roy. Micros. Soc. [London], 1910, No. 3, p. 317*).—The author reports a case in which the embryos of *Filaria quadrispina* occurred in the intestines of *Ixodes ricinus* taken from the beech marten (*Mustela foina*). It is said that there were also many filariæ beneath the skin of the marten.

---

[a] Science, n. ser., 30 (1909). No. 774, p. 603.

Eradication of the southern cattle tick, B. H. Ransom (*Advance print from Proc. 7, Internat. Zool. Cong. 1907, pp. 8* [*pub. 1910*]).—A brief account of the work of eradication of *Margaropus annulatus* being carried on by this Department.

[Observations upon Filaria (Microfilaria) philippinensis], P. M. Ashburn and C. F. Craig (*Abs. in Jour. Trop. Med. and Hyg.* [*London*], *12* (*1909*), *No. 11, pp. 167, 168, fig. 1; Bul. Inst. Pasteur, 8* (*1910*), *No. 14, pp. 633, 634*).—The authors have found that no development of this filaria takes place in *Stegomyia calopus.* In *Culex fatigans*, its complete development was observed up to the time it became lodged in the mosquito's labium.

Fumigation dosage (*Massachusetts Sta. Rpt. 1909, pt. 1, pp. 214–247*).—Greenhouse fumigation experiments with hydrocyanic-acid gas conducted under the direction of and including introductions and notes by H. T. Fernald are here reported. A general summary of the conclusions has been previously noted (E. S. R., 22, p. 259).

Tomatoes, by W. V. Tower (pp. 214–227). The details of 16 experiments conducted to determine the effect, under varying conditions of light, temperature, and humidity, of hydrocyanic-acid gas upon tomatoes grown under glass are reported. It is concluded that prolonged exposures to weak strengths of the gas are more liable to cause injury to the plants than are shorter exposures to greater strengths. Until it is determined whether short exposures to greater strengths would be effective against the greenhouse white fly and thrips, it is thought that the best treament for the white fly on tomato plants is to fumigate them with a strength of 0.015 gm. of potassium cyanid per cubic foot for a period of from 45 minutes to 1 hour, on a dark—moonlight, or perfectly cloudy—night, in a house where the humidity is below 70° F. at the beginning of the treatment.

Cucumbers, by C. W. Hooker (pp. 227–247). The same general plan was followed in the experiments with cucumbers, and the details are presented for a total of 37 experiments in each of which 4 plants, 2 of Rawson Hothouse and 2 of White Spine varieties, were used. The best results were obtained by fumigating on clear, starlight nights with little or no moonlight, and on dry, cloudy nights. A small amount of potassium cyanid with a longer exposure seemed preferable to a large amount for a shorter exposure.

A comparison of the results of the experiments on cucumbers with those on tomatoes indicates that the former are much the hardier, successfully resisting more cyanid and longer exposures.

Papers on deciduous fruit insects and insecticides.—The one-spray method in the control of the codling moth and the plum curculio, A. L. Quaintance et al. (*U. S. Dept. Agr., Bur. Ent. Bul. 80, pt. 7, pp. 146, pls. 2, figs. 5*).—The authors here report in detail upon investigations conducted during the season of 1909 to determine the relative value in the control of the codling moth and plum curculio, under eastern conditions, of the one-spray method in comparison with a schedule of applications requiring a total of from 3 to 5 treatments according to locality and representing practically the method of spraying considered best for the localities in question. "The so-called one-spray method of spraying for the codling moth on apples consists essentially in making the application following the dropping of the petals so thorough that it will result in the practical extermination of the first brood of larvæ, subsequent treatments, therefore, becoming unnecessary." The work was carried out in Virginia, Arkansas, and Michigan, and included 4 orchards, with a considerable range in climatic conditions.

The percentages of fruit free from codling-moth and plum-curculio injury on the several plats from the several localities are summarized in the following table:

Percentages of fruit free from injury by the codling moth and plum curculio on one-spray, demonstration, and unsprayed plats.

Locality.	Codling moth.			Plum curculio.		
	One spray.	Demonstration.	Unsprayed.	One spray.	Demonstration.	Unsprayed.
Siloam Springs, Ark.	92.76	98.12	66.74	86.34	82.88	8.85
Crozet, Va.	84.07	94.13	53.02	73.93	86.89	54.02
Mount Jackson, Va.	91.68	92.74	54.00	57.90	40.82	27.23
Saugatuk, Mich.	93.61	97.66	77.79	97.54	98.77	87.42
Average of four localities	91.46	96.57	65.14	77.10	83.37	49.17

The comparative effect of the treatments on the point of entrance of the fruit by the codling-moth larvæ during the entire season is shown in the following table:

Percentages of larvæ entering fruit at the calyx, side, and stem, respectively, first and second broods of the codling moth combined.

Locality.	Calyx.			Side.			Stem.		
	One spray.	Demonstration.	Unsprayed.	One spray.	Demonstration.	Unsprayed.	One spray.	Demonstration.	Unsprayed.
Siloam Springs, Ark.	15.96	54.81	79.73	75.38	41.93	15.93	8.66	3.26	4.34
Crozet, Va.	4.55	7.73	50.38	89.64	85.49	37.94	5.81	6.78	11.68
Mount Jackson. Va.	8.99	13.68	77.62	77.70	77.20	16.26	13.31	9.12	6.12
Saugatuck, Mich.	1.83	2.86	62.74	96.92	96.83	34.44	1.25	.31	2.82
Average	7.67	15.29	68.17	85.89	79.91	25.50	6.44	4.80	6.33

The following general conclusions are drawn:

"It appears that very satisfactory results may be obtained by the one-spray method, in so far as the control of the codling moth and plum curculio is concerned, although further experimentation will be necessary before final conclusions can be reached. Sight must not be lost, however, of the fact of the necessity, under eastern conditions, of making applications of Bordeaux mixture or other fungicide for the control of fungus diseases; so that in effect the one-spray method under present practices can not be recommended to orchardists in regions where fungus troubles, such as apple scab, apple fruit blotch, bitter rot, and leaf-spot affections require treatment. The results, however, show the great importance of very thorough spraying to fill the calyx cups with poison. Although the importance of accomplishing this has long been recognized by entomologists and fruit growers, it would appear that this work has not been done with sufficient thoroughness in the past, and eastern apple growers could certainly with great profit give more attention to thoroughness in the first spraying for the codling moth, immediately after the falling of the petals. The russeting of the fruit following such drenching applications of Bordeaux mixture, in which the arsenical has been generally applied, may doubtless be avoided by the substitution as a fungicide of dilute or self-boiled lime-sulphur wash."

Papers on deciduous fruit insects and insecticides.—Tests of sprays against the European fruit Lecanium and the European pear scale, P. R. Jones (*U. S. Dept. Agr., Bur. Ent. Bul. 80, pt. 8, pp. 147–160, pls. 2*).—This investigation was commenced in 1908 and carried on at the San José, Cal., laboratory. It is said that at the present time the European fruit Lecanium, *L. corni* (*armeniacum*), and the European pear scale, *Epidiaspis pyricola*, more commonly known in California as the Italian pear scale, are the most important pests with which orchardists in the Santa Clara Valley have to deal, the former species being especially abundant. Details of the investigation are presented.

Distillate-oil emulsion at 5 per cent and 6 per cent strengths, with and without caustic soda, and crude-oil emulsion at 12 per cent strength are effective in controlling both of these scales and in cleaning up the trees from lichens and do not injure the trees when applied as a winter treatment. Resin-soda wash gives similar results with the European fruit Lecanium, and distillate oil at 6 per cent strength (mechanical mixture) with the European pear scale. Caustic-soda and creosote-oil emulsion sprays control both of these scales and destroy the lichens, but are injurious to the tree. Lime-sulphur and borax sprays are not so efficient in controlling these scales, especially the European fruit Lecanium, as are the distillate-oil and crude-oil emulsions, and borax acts on the trees in the same way as does caustic soda.

"Distillate-oil and crude-oil emulsions appear to have distinct fungicidal properties aside from their insecticidal value.

"Distillate-oil emulsions at 6 per cent strength and crude-oil emulsion at 12 per cent strength, measured by their efficiency against scales and lichens, convenience of preparation and application, and cost, are the sprays best adapted for the European fruit Lecanium and the European pear scale. The 6 per cent distillate-oil emulsion will cost about 2½ cts. for each prune tree and 3½ cts. for each apricot tree. The 12 per cent crude-oil emulsion will cost about 2 cts. for each prune tree and 2½ cts. for each apricot tree.

"All sprays, to insure the best results, should be applied with a power outfit at a high pressure (180 to 200 lbs.). A coarse, drenching spray applied with crook nozzles is preferable, and February is the best month in which to spray."

FOODS—HUMAN NUTRITION.

[Durum wheat flour and other food topics], E. F. Ladd and Emily E. May (*North Dakota Sta. Spec. Bul. 24, pp. 179–194, fig. 1*).—The exposing of fruit for sale without proper protection, adulterated linseed oil, cold storage of foods, and other topics are discussed, and analyses of whiskies are reported together with the results of the examination of miscellaneous food samples.

In connection with a discussion of durum flour, the results are given of a test made by L. M. Thomas of the effects upon the character of the bread of blending a definite percentage of durum wheat flour with hard spring wheat flour. The experiments are regarded as preliminary and too limited for general deductions, "yet it is safe to say that a considerable admixture of durum wheat flour to high-grade hard spring wheat flour will not seriously impair its quality," when judged by the volume of the loaf, the color, and other factors usually considered.

The cost of milling of hard spring wheat and durum wheat was also studied with a view to securing comparative data regarding the two sorts of flour. The average horsepower required per hour for grinding the durum wheat was 22.01 in comparison with 19.42 for hard red spring wheat. "To produce 100 bbls. of flour of durum and hard spring wheats, 53.13 per cent of the total horsepower per hour was required for the durum and 46.86 per cent for the grinding of the hard spring wheats."

"The difference in the cost of power for milling and the extra time would be about $3\frac{1}{2}$ cts. per bushel greater for durum wheat than for the hard spring wheats. Certainly, a difference of 5 cts. per bushel would be a wide margin, whereas, there has been a difference of 15 to, approximately, 30 cts. per bushel in the price paid for the two classes of wheat; and on the date of the test, a difference of 26 cts. per bushel."

[Bread and other food topics], E. F. Ladd and Alma K. Johnson (*North Dakota Sta. Spec. Bul. 26, pp. 211–226*).—The desirability of regulating the weight of a loaf of bread, alum in food products, and other topics are discussed, a score card for use in the inspection of grocery stores is presented, together with the results obtained by the use of such a card in inspection work, and the results of the examination of miscellaneous samples of food are summarized.

A study of wrapping bread, by L. W. Thomas, is reported, in which unwrapped loaves and loaves wrapped at different times after taking from the oven were compared with reference to the effect upon the aroma and taste, the condition of the crust, and the general condition of the bread. "The loaves were wrapped carefully with a good grade of paraffined paper upon a hot plate so that the loaf was practically sealed from the air when cool." The examinations were made at intervals of 18, 36, 60, and 108 hours. For purposes of comparison samples were also kept in closed cans.

The recorded data, according to the author, for the most part gave only negative results. "Although the loaves wrapped hot lost less moisture they seemed to keep as well as the loaves wrapped cold, and they were better in flavor and aroma. The loaves which were not wrapped lost moisture rapidly together with flavor and aroma." The condition of the bread kept in a closed can indicated that the "effect of placing in a clean enclosed compartment is much the same as wrapping.

"One thing that is plainly apparent from these tests is that the wrapping does not prevent the loaves from becoming stale after 36 or 48 hours.

"Although the work above described is plainly in favor of the wrapping of bread, yet it would be of interest if similar tests were made in cooperation with some commercial bakery."

In connection with this study H. L. White reports determinations of the moisture and acidity of the wrapped and unwrapped bread.

According to his summary, "bread made under cleanly conditions, from a good quality of flour and yeast, does not grow acid, whether wrapped or not, even after 108 hrs.

"In this series of determinations, bread wrapped while warm and bread wrapped while hot show a slight increase in the acidity of the inside portion of the loaf as compared with the crust. In the case of the bread wrapped while hot the increase is about 9 per cent.

"The loaf of commercial baker's bread, purchased in the open market, had a high percentage of acidity. . . . The inside portion contained $2\frac{1}{4}$ times as much acidulous material as the average of all loaves baked in this station and wrapped while hot. The inside portion of this loaf contained 47 per cent more acid-reacting material than the crust.

"Investigations along this line are being continued."

Continuing earlier work (E. S. R., 24, p. 67), milling and baking tests of hard red spring wheat and Velvet Chaff wheat of the crop of 1910 are briefly reported by T. Sanderson. According to the experimental data, the average percentage of straight flour from hard red spring wheat was 1.7 per cent higher than from the Velvet Chaff, and the loss in milling 1.1 per cent lower. As to the power used in the manufacture, there is no perceptible difference. . . .

Assuming that a bushel of hard red spring wheat is worth $1.1691, a bushel of Velvet Chaff on the same basis would be worth $1.1482.

Baking tests with wheats, made by C. H. Bailey, of this Department, are briefly summarized, which "show the straight flours milled from fife and bluestem samples to be a little better on the average than the Velvet Chaff samples as regards baking qualities, although in a number of cases Velvet Chaff wheat flours gave results better than the average of the fifes and bluestems.

Experiments on the baking quality of wheat, W. SCHNEIDEWIND (*Landw. Jahrb., 39 (1910), Ergänzungsb. 3. pp. 124–126, 204, 205*).—Baking tests were made with wheat which had been fertilized in different ways.

According to the author, the best results were obtained with wheat grown on plats which had previously been fertilized with stable manure, and he concludes that owing to its slow action this material exercises a favorable effect on the quality of wheat. In general he considers that baking quality is not dependent upon the amount but upon the character of the gluten, and this in turn is dependent upon the weather conditions and the fertilizer.

Bleached flour, R. M. ALLEN (*Kentucky Sta. Bul. 149, pp. 65–124*).—A considerable amount of data regarding the purpose and effect of flour bleaching in milling and in the trade, is summarized, the action taken under the Kentucky law is pointed out, and opinions regarding flour bleaching obtained from 65 Kentucky millers are presented. The majority of the millers were not in favor of bleaching.

[Miscellaneous food topics], S. C. DINSMORE (*Nevada Sta. Circs. 8–11, p. 1 each*).—The subjects included are artificial coloring in food products, the use of benzoate of soda and cereals in meat products, ice cream cones, and vinegar.

Food inspection decisions (*U. S. Dept. Agr., Food Insp. Decisions 127, pp. 6; 128–129, pp. 2 each*).—The subjects considered are the decision of the Attorney-General in regard to the labeling of whiskies sold under distinctive names, sago and tapioca, and the certification of straight dyes and mixtures under secondary certificates, the last being an amendment to Food Inspection Decision No. 77 (E. S. R., 19, p. 461).

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 609, p. 1; 610, pp. 2; 611, p. 1; 612, pp. 2; 613–614, p. 1 each; 615–617, pp. 2 each; 618, p. 1; 619–621, pp. 2 each; 622, p. 1; 623–624, pp. 2 each; 626, pp. 2; 627, p. 1; 630–631, p. 1 each; 633–635, p. 1 each; 636–637, pp. 2 each; 639, pp. 2; 640–643, p. 1 each; 644–645, pp. 2 each; 646–647, p. 1 each; 648, pp. 3*).—These notices of judgment have to do with the adulteration of a desiccated egg product, desiccated eggs, evaporated eggs, tomato catsup, lemon flavor, vinegar, and olives; the misbranding of drug products, coffee, "vanoleum, concentrated vanilla," a breakfast food, olive oil, vanilla extract, and currant jam; and the adulteration and misbranding of blackberry cordial, cider, vinegar, olive oil, lemon extract, and mincemeat.

State control of milk and meat supplies, A. M. TROTTER (*Trans. IX. Internat. Vet. Cong. The Hague, 1 (1909), S. G. V. 7, pp. 14*).—According to the author's summary, all meat should be put on the market in the following forms: "Beef, in sides or quarters; veal, in carcasses or sides; mutton and lamb, in carcasses; pork, in sides; and exception might be made in the case of certain choice cuts, which would be specified in the international code.

"Meat should be imported only through certain ports, at each of which the Government should station the necessary staff, who would be bound to observe the same method and standard."

Summaries in French and German are appended to the paper.

Meat from the standpoint of hygiene, E. AUREGGIO (*Assoc. Franç. Avanc. Sci., Compt. Rend., 37 (1908), pp. 1380–1398*).—A digest of data regarding diseases conveyed by animal foods, the hygiene of meat and milk, and the adulteration of these foods, the subject being treated from the standpoint of military as well as public hygiene.

The value of Indian buffalo meat as food, F. PUNTIGAM (*Tierärztl. Zentbl. 33 (1910), Nos. 13, pp. 195–201; 14, pp. 213–215; abs. in Chem. Zentbl. 1910, II, No. 8, p. 588*).—On the basis of a chemical study of the flesh and fat the conclusion is reached that buffalo flesh is inferior to beef and the author therefore considers the question of the substitution of this flesh for beef with reference to pure food law regulation.

Examination of meat juices, K. MICKO (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 9, pp. 537–564, pl. 1*).—A number of general conclusions are drawn from a study of the characteristics of commercial meat juices of different sorts.

According to the author's summary, meat juices are characterized by the presence of hemoglobin, even if the meat juice is prepared at a temperature of 60°. Meat juice prepared at low temperature has a low coagulation point which lies at about 40°. The coagulation point, however, is not constant. In comparison with meat extract, meat juice contains much less albumoses. Other characteristics are discussed, and in general the author concludes on the basis of chemical evidence that meat juices are to be regarded as specific preparations and should be judged accordingly. The kind of animal from which the juice is prepared can be determined by biological methods.

The digestibility of blood as a foodstuff, E. BECK (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 7, pp. 455–463*).—Experiments with man and animals are reported which, in general, show that such foodstuffs as blood sausage are well assimilated. According to the author, in a diet containing bread and blood sausage 93.3 per cent of the total nitrogen, 90.3 per cent of the total fat, and 73.6 per cent of the total iron supplied were assimilated, and he concludes that the use of such foodstuffs as blood sausage is rational.

A comparison of beef and yeast extracts of known origin, F. C. COOK (*U. S. Dept. Agr., Bur. Chem. Circ. 62, pp. 7*).—Analyses are reported and discussed of beef extracts obtained from the Missouri Station and of commercial yeast extracts.

According to the author's summary, the yeast extracts contain approximately 1 per cent ether-soluble material and the beef extracts larger amounts. Cholesterol was not found in the ether extracts, and sarcolactic acid only in the yeast extracts.

"The phosphorus of beef is largely water-soluble, consequently a considerable percentage of the ash of beef extracts is composed of this constituent. Approximately one-half of the sulphur of beef is water-soluble. Yeast extracts derived from yeast rich in phosphorus also contain a large amount in the ash. The total amount present is larger than the ash content, showing that some phosphoric acid is volatilized on ashing. The organic phosphorous determined by the Siegfried-Singewald method gives approximately the 1:10 ratio compared with the total as suggested by those authors.

"The total nitrogen of the beef extracts on the water-free and fat-free basis averages 11.82 per cent, that of the yeast extracts averages 7.44 per cent. The amino nitrogen figures for the beef preparations are nearly double those of the yeast extracts.

"Although the water-soluble nitrogen of beef, which constitutes 25 per cent of the total nitrogen, consists of approximately two-thirds protein and one-third amino nitrogen, the samples of beef extracts analyzed average 72 per cent of amino nitrogen and 28 per cent of protein nitrogen.

"The general appearance and odor of the two varieties of extracts are very similar. As a food both are extremely limited in value. The beef extracts contain more nitrogenous extractives than the yeast preparations, otherwise their general composition is much the same."

The purin content of different food materials, G. BESSAU and J. SCHMID (*Ther. Monatsh., 1910, p. 116; abs. in Zentbl. Gesam. Physiol. u. Path Stoffwechsels, n. ser., 5 (1910), No. 11, pp. 442–444*).—Determinations are reported of the purin content of a large number of food materials including both animal and vegetable products. As is apparent from the data presented, the amount of nitrogenous bases in meat varies within rather narrow limits. Considerably greater differences are observed with fish, the higher values being found in small fish such as sardines and anchovies which are served whole. The relatively high amount of purin bases in some vegetable foods is also noticeable. See also a previous note (E. S. R., 23, p. 769).

Uses of vegetables, fruits, and honey (*Ontario Dept. Agr. Bul. 184, pp. 32*).—A discussion of the cookery of vegetables, fruits, and honey, including a collection of recipes, in revision of an earlier bulletin.

Maple-sap sirup: Its manufacture, composition, and effect of environment thereon, A. H. BRYAN (*U. S. Dept. Agr., Bur. Chem. Bul. 134, pp. 110, pl. 1, figs. 4, map 1*).—In connection with this report of data on the manufacture of maple sirup, analyses are given of 481 samples of known purity from the most important maple-producing States in this country and from Canada, which form a basis for comparing and grading maple sirups. The effect of environment on the composition of maple sirup is one of the topics especially considered. Historical and other general data are summarized and analytical methods described.

Considering the 395 samples from the United States, the average moisture content was 34.19, sucrose 62.64, invert sugar 1.49, ash 0.66, and undetermined material 1.02 per cent. The polarization values were: Direct, at 20° C., +60.93; and invert, at 20° C., −22.16. The average values for the 86 Canadian samples were: Moisture content 34.34, sucrose 62.24, invert sugar 1.41, ash 0.62, and undetermined material 1.59 per cent. The polarization values were: Direct, at 20° C., +59.33; and invert, at 20° C., −23.17.

The results of a special study of the constituents of maple-sirup ash are also reported. The average results for 100 samples from different States showed that the ash contained 38.07 per cent potash, 21.88 per cent lime, 5.39 per cent phosphoric acid, and 1.59 per cent sulphates.

Considering the samples from both the United States and Canada, the average basic lead value was 2.70, calculated to dry substance, and the average neutral lead number was 0.79. The average malic acid value determined by the modified calcium chlorid method was 0.84, and by the calcium acetate method 1.01.

In discussing factors which influence the character of the final product, the author considers that it is clearly shown "that the sap run has a decided effect on the total ash and the malic acid content of the maple sirup, the latter being shown by the increase in the lead number as well as by the malic acid value. As regards taste, there is not much difference between the first and middle runs, but between the first and last runs the change is marked."

As regards the effect on composition of using eggs or milk to cleanse sirup, it may be said on the whole "that there is no change in composition of the maple sirup, other than the slight increase of protein, by such cleansing, but its use is of questionable benefit since the same results can be attained by filtering."

Comparison of sirups from sap collected in covered and uncovered buckets showed that the difference in color was slight but that "the ash content of the sirup from the uncovered buckets is greater than from the covered ones. This increase occurs in the soluble ash, as there is only 0.04 per cent difference in the insoluble ash of the two samples."

The author points out that some of the constituents of sirup decrease as the more northern latitudes are reached. "In general, this is true of the total ash and the lead number and to a less degree of the malic acid value. There are a few exceptions to this general tendency which may be due to the altitude of the sugar bush, to the soil, or to the exposure.

"Soil data were collected from the individual makers, but on compiling them no distinctions that would admit of any classification were found. No doubt the kind of soil on which the bush is located influences, to a slight extent, the ash content and possibly the malic acid value and lead number. Also sirup made from soft and that from hard maples in the same locality might show very distinct differences. The few samples of soft maple sirup collected are hardly sufficient to afford any basis of comparison."

The bulletin also includes a summary of statistics of the maple-sugar industry in the United States, and a bibliography of the general subject of maple sugar.

Strained honey, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 217, pp. 19*).—Of 148 samples of honey collected in the Dominion of Canada 122 were found to be genuine, 20 doubtful, and 3 adulterated, while 3 were sold as compounds.

Dried bananas, M. Winckel (*Apoth. Ztg., 25 (1910), No. 49, pp. 440; abs. in Chem. Zentbl., 1911, II, No. 8, p. 588*).—Analytical data are reported, and the nutritive value and digestibility of bananas discussed, particularly dried bananas.

The fat and nitrogen content of a number of nuts, H. Kühl (*Pharm. Ztg., 54 (1909), No. 6, p. 58; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 2, pp. 98, 99*).—Peanuts, Brazil nuts, hazel nuts, and walnuts were analyzed.

Examination of wine musts, C. von der Heide et al. (*Arb. K. Gsndhtsamt., 35 (1910), pp. 132–392*).—Results are reported in detail of the analyses made in the different German provinces of musts in 1908–9.

Results of the official wine statistics 1908–9, A. Günther (*Arb. K. Gsndhtsamt., 35 (1910), pp. 1–26*).—Information is given regarding the extent of the studies of wine, and information is summarized on a variety of topics, including among others, the occurrence of arsenic, lead, and copper in fruits sprayed with arsenic or copper solutions.

Reports of institutes carrying on wine analysis, C. von der Heide et al. (*Arb. K. Gsndhtsamt., 35 (1910), pp. 27–131*).—Reports are given in detail of wine analyses in different German provinces.

Preservatives and other materials, A. Beythien, H. Hempel, and P. Simmich (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 8, pp. 514–520*).—Data are reported regarding the examination of a number of such materials as food preservatives, a so-called "nutrient salts coffee," and some other materials.

Headache remedies (*Maine Sta. Off. Insp. 26, pp. 89–96*).—Headache remedies are discussed and the results are reported of the examination of a considerable number of samples of such goods.

The preservation of drugs, L. A. Brown (*Kentucky Sta. Bul. 150, pp. 127–178, dgm. 1*).—Information is summarized regarding the methods for handling and storing drugs and drug products in such a way as to prevent deterioration.

Food tables, H. Schall and A. Heisler (*Nahrungsmitteltabelle. Wurzburg, 1909, pp. 42*).—The author has included in convenient form tables showing the average composition of different classes of foods, beverages, and mineral waters; also tables of ash content, digestibility, dietary standards, and other material of interest to the student of nutrition.

Free-hand cooking on scientific principles (*Bul. Amer. School Home Econ., Ser. 1, 1910, No. 18, pp. 36, figs. 4*).—Information regarding such matters as weights and measures used in cookery and time required for cooking foods is summarized in tabular form and basal recipes are given.

Micro-organisms and digestion, METCHNIKOFF ET AL. (*Ann. Inst. Pasteur, 23 (1909), No. 12, pp. 937–941; abs. in Hyg. Rundschau, 20 (1910), No. 21, pp. 1198–1200*).—Experiments are reported on the possibility of digestion without the aid of bacteria, the bat being selected on account of its short intestine. It was found that digestion may be accomplished without the action of micro-organisms, and the general conclusion was accordingly drawn that animal life is possible without bacterial aid.

Progress report of investigations in human nutrition in the United States, 1905–1909, C. F. LANGWORTHY (*U. S. Dept. Agr., Office Expt. Stas. Rpt. 1909, pp. 361–397*).—A summary and digest of data classified under a number of topics such as studies of food and food products, cooking and its relation to nutritive value, dietary studies, and experiments with the respiration calorimeter and other technical studies. An earlier summary has been previously noted (E. S. R., 18, p. 459).

ANIMAL PRODUCTION.

Effect of Porto Rico molasses on digestibility of hay and of hay and concentrates, J. B. LINDSEY and P. H. SMITH (*Massachusetts Sta. Rpt. 1909, pt. 1, pp. 82–131*).—A study of the effect on digestibility of a ration when molasses is fed in excess, in continuation of previous work (E. S. R., 19, p. 264).

On a ration of hay and molasses, when the cane molasses constituted from 10 to 13 per cent of the dry matter of the total ration, it was without pronounced effect on the digestibility of the hay. In the case of one trial with 1 sheep there was a very marked depression, but in the other 5 single trials with different sheep the influence was slight, or contradictory. When molasses composed 20 per cent of a hay and molasses ration the depression was quite noticeable, averaging in the case of 4 single trials with 4 different sheep 10.14 gm. of digestible dry matter and 7.37 gm. of digestible organic matter for each 100 gm. of molasses fed.

Two experiments were conducted in each case with 2 sheep on a ration of hay, corn meal, and molasses, using 100 and 200 gm. of the last. Unfortunately, in each experiment one of the sheep suffered from indigestion and did not complete the trial. When molasses constituted 11 per cent of the dry matter of the ration the depression was 10.79 gm. of dry matter and 9.51 gm. of organic matter per 100 gm. of molasses. When molasses constituted 20 per cent of the ration the depression was 18 gm. of dry matter and 17 gm. of organic matter per 100 gm. of molasses.

On a ration of hay, gluten feed, and molasses the depression was higher with small than with large amounts of molasses, the loss averaging substantially 8 per cent. "Why molasses seemed to exert less depression on the hay than on a ration composed of hay and a concentrate is difficult of explanation."

Observations showed that there was no warrant for concluding that molasses increased the peristaltic action of the intestines. Other reasons which have been suggested as to the cause of depression are discussed. Analyses of feeds and feces, digestion coefficients, amounts of water drank, methods of feeding, weights of animals, and other data are given. Further investigations are contemplated.

Beet residues for farm stock, J. B. LINDSEY (*Massachusetts Sta. Rpt. 1909, pt. 2, pp. 21–26*).—A discussion of methods of using dried beet pulp, dried molasses beet pulp, and beet leaves as rations for live stock. An analysis of molasses beet pulp is reported as follows: Water 8 per cent, protein 9.5 per cent, fat 0.4 per cent, nitrogen free extract 61.3 per cent, fiber 15.4 per cent, and ash 5.4 per cent. The opinion expressed regarding the feeding value of beet residues may be summarized as follows:

Dried molasses beet pulp is a very palatable food for dairy stock, and nearly equal to corn meal in its value for such stock. Dried beet pulp has somewhat less value. Their use may occasionally be necessary, but it should be the rule to produce starchy or carbohydrate feeds rather than to purchase them. When used, they should be moistened before feeding. Beet leaves may be fed to dairy stock with fairly satisfactory results, either fresh or in the form of silage, but they should not be largely used as food for cows producing milk for infants.

Condimental and medicinal stock and poultry foods, J. B. LINDSEY (*Massachusetts Sta. Rpt. 1909, pt. 2, pp. 32–38*).—A résumé of work previously noted (E. S. R., 17, p. 581).

Notice of judgment (*U. S. Dept. Agr., Notice of Judgment 625, pp. 2*).—This relates to the alleged adulteration and misbranding of a proprietary poultry food containing 30 per cent pure bone ash.

Ration experiments with swine, 1906–1908, W. L. CARLYLE and G. E. MORTON (*Colorado Sta. Bul. 165, pp. 3–23, figs. 2*).—Alfalfa hay, wheat, wheat shorts, field peas, beets, and tankage were contrasted as protein supplements for barley and for corn in feeding tests with grade Poland-China swine during 2 successive years. The results are summarized in the following table:

Feeding experiments with swine in 1906–7 and 1907–8.

Number of pigs.	Ration.	Total gain per head.	Pounds feed per 100 pounds gain.				Cost of feed per pound of gain.
			Grain.	Hay.	Tankage.	Beets.	
	Series of 1906–7 (13 weeks).	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Cents.*
10	Barley, alfalfa hay	107	508	75			5.27
10	Corn, alfalfa hay	115	508	76			5.27
10	Barley and corn, equal parts, alfalfa hay	131	435	67			4.52
10	Barley and wheat, 1:1	115	476				5.95
10	Barley and peas, 1:1	111	482				7.23
10	Barley and shorts, 1:1	117	457				4.57
10	Barley and tankage, 10:1	130	405		46		4.97
10	Corn and tankage, 10:1	142	386		42		4.70
10	Barley, beets	94	475			478	5.95
10	Corn, beets	86	544			498	6.69
	Series of 1907–8 (15 weeks).						
8	Barley and corn, equal parts, alfalfa hay	116	496	56			5.10
8	Barley, corn, and tankage, 3:3:1	171	338		56		4.50
8	Barley and tankage, 6:1	158	367		61		4.89
8	Corn and tankage, 6:1	164	353		59		4.71
8	Durum wheat and tankage, 6:1	161	360		60		6.60
8	Durum wheat, corn, and tankage, 3:3:1	173	334		56		5.30

The amounts of digestible nutrients required for 100 lbs. gain with the different rations are also given. There was no advantage in feeding beets in addition to the grain, as the 2 lots so fed ate as much grain as when the beets were not given. Analyses are reported for the barley, durum wheat, tankage, and alfalfa hay used in the tests.

Methods of fattening steers, W. A. COCHEL and S. W. DOTY (*Pennsylvania Sta. Bul. 102, pp. 3–16, figs. 4*).—This bulletin reports experiments on the comparison of concentrated and bulky rations, the comparison of heavy and light rations of corn silage for fattening steers, and the value of shelter for silage-fed cattle. The average gains per head and day for 2-year-old grade Herefords and Shorthorns for a period of 5 months were as follows: On full feed of grain and one-half feed of corn silage 2.099 lbs., at a cost of 11.24 cts. per pound; on two-thirds full feed of grain and full feed of corn silage 1.98 lbs., at a cost of 9.75 cts. per pound; on a full feed of both grain and corn silage when fed to steers in a box stall 2.138 lbs., at a cost of 11.05 cts. per pound; and on full feeds of grain and corn silage when fed in an open shed 2.362 lbs., at a cost of 10.03 cts. per pound. The lots received shredded stover and mixed hay according to appetite. The grain consisted of broken ear corn, shelled corn, and cotton-seed meal. The cost of gains was based on the following prices: Corn 67.7 cts. per bushel, and cotton-seed meal \$34, stover \$3.50, silage \$3, and mixed hay \$12 per ton.

A study of the consecutive months during the test would seem to indicate that with thin cattle a bulky ration is as efficient as one of more concentrated form, but as cattle fatten concentrates become necessary if the rate of gain is to be maintained.

"The results show clearly that when corn is high in price it is more profitable to feed a lighter grain ration with a greater proportion of roughage or, if the heavy grain ration is fed, that the cattle should be marketed before they become as fat as those in lot 1 were at the close of the experiment. The results agree with those reported during the 2 preceding winters in that the chief demand in Pennsylvania is for cattle that are not made fat enough to grade as 'choice' or 'prime' upon the central markets, but for those that grade as 'good butcher' steers or 'good killers.'"

The chief value of the large quantities of corn silage was to reduce the cost of production and increase the rate of gain. "Steer feeding was a profitable venture in Pennsylvania under conditions prevailing at the experiment station from December 15, 1909, to May 3, 1910, the average price received for corn fed to experimental cattle being \$1.05 per bushel. The margin necessary between buying and selling prices to prevent loss from fattening cattle on a bulky ration was \$1.23 per hundredweight, and on a concentrated ration, \$1.68 per hundredweight. The difference in margin necessary for feeding in the shelter experiment was 17.2 cts. per hundredweight in favor of outdoor feeding."

"Protection from cold is as unnecessary for fattening cattle on succulent feeds as when dry feeds are used."

Analyses of feeds are given and also their fertilizing value.

Baby beef production, H. W. Norton, Jr. (*Michigan Sta. Bul. 261, pp. 185–213, figs. 5*).—These feeding trials, which were continued from the fall of 1905 until the summer of 1909, were conducted to compare the relative profits of the two methods of handling an ordinary grade beef herd. In herd No. 1, which consisted of 10 grade cows, the calves were nursed by their dams and also received supplementary feed. After weaning they were finished and marketed as baby beeves at 18 months of age. In herd No. 2, also consisting of 10 grade cows, the calves were weaned at birth, reared on skim milk and supplementary feed by the method previously noted (E. S. R., 22, p. 573), and finished and marketed with the other lot, their dams being milked.

The figures obtained for herd No. 1 were as follows: The average cost of the feed per year for the cows suckling calves was \$32.32, and that of the supplementary feed consumed by the baby beeves \$34.65, making the average cost per head of the baby beeves \$66.97. The average weight per head was 995 lbs., making the average cost for production per hundredweight \$6.73, and no other revenue was obtained from the cows. The corresponding figures for herd No. 2 were as follows: The average cost of the feed consumed by the baby beeves raised by the skim milk method was $50.77, and their average weight per head 966 lbs., making the average cost of production per hundredweight $5.24. In addition, the average value of butter and skim milk produced by the cows was $61.12, and the average cost of their feed per head per year $33.84. This leaves a profit of $27.28 per head for the cows on the skim milk lot and also a difference of $1.49 per hundredweight from the baby beeves.

"The average age at the time of marketing was 532 days for the suckled lot and 537 days for the skim-milkers. . . . The quality of the baby beeves produced by the two methods was practically the same and the skim-milk lots brought the same prices as the suckled lots when put on the market."

Australian chilled beef, H. D. Baker (*Mo. Cons. and Trade Rpts.* [*U. S.*], *1910, No. 357, pt. 2, pp. 77–79*).—An account of the shipments of chilled beef from Australia. The Linley process for chilling beef is described, and there is a brief note on a new dry-air process of preservation.

Some experiments in grazing and soiling, S. E. McClendon (*Louisiana Stas. Bul. 123, pp. 3–16*).—This contains brief reports of several tests with forage crops and other feeds for pigs.

The average daily gains per head and day were as follows: On oat pasture 0.37 lb., in a second experiment on oat pasture 0.21 lb., on rape 0.12 lb., on rape and oats 0.12 lb., on sweet potatoes 1.23 lbs., on carrots 0.57 lb., on beets 0.42 lb., in a second experiment with beets 0.287 lb., and on beets and corn meal 1.14 lbs. The cost per pound of gain with several feeds was as follows: Using rice bran 6.9 cts., rice polish 5 cts., in a second experiment with rice polish 4.6 cts., rice polish and molasses 5.5 cts., and grazing oats about 4 cts. As these tests were undertaken in different years and under different conditions these figures do not represent the comparative value of the rations fed.

Information concerning the Colorado carriage horse breeding station, J. O. Williams (*Colorado Sta. Bul. 166, pp. 3–12, figs. 5*).—This contains an account of the history and objects of the experiment in horse breeding now in progress at the Colorado Station in cooperation with the Bureau of Animal Industry of this Department. The pedigrees of the animals now in service as foundation stock are given.

Digestion experiments with poultry, J. M. Bartlett (*Maine Sta. Bul. 184, pp. 317–336, figs. 2*).—Digestion coefficients of a number of feeds obtained with cocks, hens, and capons are reported. The feces were collected with a rubber sheet attached to the fowl. In the case of one capon the feces and urine were collected separately by means of an artificial anus established in the body walls, but this method was abandoned because the bird was in an abnormal condition, though the results obtained compared favorably with the results when the separation was made by chemical means.

The results show that the digestion coefficient of most nutrients did not materially differ from those obtained with other farm animals, except that poultry digested very little crude fiber. The nutrients of wheat, especially ether extract, did not seem to be as well handled as most other concentrated grains. Bran, though much in favor as a poultry feed, showed a low digestibility. A mixture of equal parts of corn meal and fine cut clover was more digestible than bran and at present prices more economical, providing of course that the poultryman produces his own clover. An exclusive diet of wheat had a deranging effect upon the digestive system of the birds. Corn was considered as making a valuable grain for poultry because of its palatability and high digestibility, though it can not be fed alone as it is too concentrated a feed and also deficient in protein. Oats and India wheat were found to be desirable grains and may be used to some extent to give variety to the ration, though more expensive than corn unless in a section of the country where they can be bought or produced much more cheaply than at the commercial centers.

The digestion coefficients of the different feeds are given in the following table:

Average of the digestion coefficients obtained with poultry.

Kind of feed.	Number of experiments.	Organic matter.	Protein.	Fat.	Nitrogen-free extract.	Crude fiber.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Wheat bran (coarse)	3	46.7	71.7	37.0	46.0	13.5
Corn (whole)	1	86.6	68.3	87.0	91.6	....
Corn (cracked)	2	83.3	72.2	87.1	88.1	....
Corn meal	2	83.1	74.6	87.6	86.0	....
Corn meal and clover, 1:1	3	56.4	71.5	66.9	61.6	10.4
Clover, calculated	3	27.7	70.6	35.5	14.3	10.4
Corn meal and beef scrap, 1:1	2	82.1	90.0	95.0	75.8	....
Beef scrap, calculated	2	80.2	92.6	95.6	....	....
Corn meal and beef scrap, 1:1	4	87.0	81.5	91.5	90.5	....
India wheat	3	72.7	75.0	83.8	83.4	20.9
Oats (whole)	4	60.6	78.2	85.6	64.1	....
Oats (rolled)	4	89.3	80.1	92.2	94.3	....
Wheat (hard)	1	81.8	71.3	56.9	80.8	....
Wheat (soft)	5	81.8	74.4	54.4	88.5	....
3,000 gm. bran, 1,125 gm. corn meal, 1,125 gm. gluten feed, 600 gm. beef scrap	5	51.3	78.6	74.8	51.4	....
200 gm. bran, 100 gm. corn meal, 50 gm. linseed meal, 40 gm. beef scrap	3	51.4	78.6	78.5	46.7	....
200 gm. bran, 50 gm. corn meal, 50 gm. linseed meal, 100 gm. gluten feed	3	42.3	75.8	68.7	37.8	....
200 gm. bran, 50 gm. corn meal, 50 gm. linseed meal, 100 gm. gluten feed, bone ash	3	46.9	79.0	68.8	45.3	....

There are references to other literature on the subject, and a table has been prepared showing the average digestion coefficient obtained with poultry by other investigators.

Seven methods of feeding young chickens, J. E. Rice and Clara Nixon (*New York Cornell Sta. Bul. 282, pp. 415–462, figs. 25*).—The purpose of this experiment was to test the efficiency of chick rearing by 7 different methods of rations and methods of feeding. The eggs used were from vigorous, mature single comb white Leghorn stock on free range. The methods of incubating and brooding are described.

The cost of rearing the different flocks of chicks for the first 6 weeks is given in the following table:

Average gain and cost of feeding chicks the first 6 weeks by different methods.

Ration.	Number of chicks in experiment.	Number of chicks at end of 6 weeks.	Average weight of chicks at 6 weeks.	Total amount of food consumed.	Cost per pound gain.	Cost of food per 100 chicks.	Cost of labor per 100 chicks.
			Pounds.	*Pounds.*			
Cracked grain and bran	110	90	0.370	129.73	$0.160	$2.940	$1.423
Cracked grain	110	85	.375	125.88	.173	3.228	1.507
Cracked grain, dry mash	110	97	.343	166.13	.193	3.589	1.320
Dry mash	110	94	.345	167.56	.196	3.608	1.362
Wet mash, powdered milk	110	106	.542	193.91	.115	3.805	1.505
Wet mash, skim milk	110	102	.511	232.93	.123	3.725	1.565
Variety ration	110	110	.503	196.57	.117	3.571	1.464

"Considering the number of chicks reared, the vigor of the chicks, and the continued palatability of the ration, the variety ration gave best results for the first 6 weeks. In total weight of flock, average weight of chicks, rapid growth and development, cost per pound gain and per pound weight, the wet mash-powdered milk ration gave best results. In feeding the wet mash rations and the variety ration, great care must be taken that the chicks are not overfed, and that they do not get spoiled or moldy food. After the first 3 weeks there is less danger of overfeeding on the variety ration."

At the end of 6 weeks all flocks were gradually accustomed to a fattening ration, and the results are shown in the following table:

Summary per flock for 6 weeks of fattening.

Ration.	Number in fattening experiment.	Number died in 6 weeks.	Average weight chicks marketed.	Total amount food consumed.	Total cost food consumed.	Total cost labor.	Total cost per pound gain.
			Pounds.	*Pounds.*			
Cracked grain and bran	90	2	1.093	250.8	$5.58	$1.21	$0.108
Cracked grain	85	2	1.204	243.1	5.38	1.21	.097
Cracked grain, dry mash	97	4	1.153	261.4	5.83	1.21	.094
Dry mash	94	7	1.114	260.8	5.86	1.21	.109
Wet mash, powdered milk	107	2	1.204	280.6	6.21	1.22	.107
Wet mash, skim milk	102	4	1.137	271.4	5.82	1.22	.118
Variety ration	110	3	1.139	286.5	6.32	1.21	.113
All flocks	685	24	1.150	1,854.6	41.00	8.49	.106

Some of the conclusions drawn from marketing the chicks are as follows: "Squab broilers are not profitably marketed in September and early October. Dry picking of broilers by amateurs is too expensive as a market proposition. Broilers should be of proper size to meet the demands of summer and fall trade, which requires a dressed weight of $\frac{3}{4}$ lb., or of $1\frac{1}{2}$ lbs. each, to be served whole in the former case as a squab broiler, or in halves in the latter instance.

"The cost of rearing a chick to 6 weeks averaged $0.098 for all flocks, or $9.80 per 100 chicks. The greatest cost per chick was in the cracked grain ration flock, $0.104, and the least in the variety ration flock, $0.094, a saving for the variety ration of $1 on 100 chicks to 6 weeks old. . . . Since this experiment was specifically a broiler-raising proposition, it would be impossible to decide from this data which ration, of the 7 tested, would be best for rearing laying stock."

Feeding and management of poultry for egg production, J. S. Jeffrey (*North Carolina Sta. Bul. 211, pp. 43-64, figs. 8*).—A discussion of the requisites for profitable egg production, with a report of experiments in feeding fowls from which a number of conclusions are drawn, including the following:

"The best results in egg production during the first period were obtained from the two pens fed a mash containing meat meal and bone meal. During the second period the best results were obtained from the pens fed skim milk. Rations which gave the lowest cost per hen for feeding did not give the greatest profit per hen during either feeding period. . . .

"Pullets were slower in developing and in coming to laying maturity on a ration containing cottonseed meal than on one containing meat meal. Hens did better than pullets on rations containing cottonseed meal . . . As far as can be judged from the work done, the main objection to cottonseed meal is its lack of palatability.

"High protein meat meal, although readily eaten by the fowls, did not give satisfactory results either in egg production or development of the fowls. . . .

"Hens fed skim milk during the second period not only laid more eggs at less cost per dozen, but gained more in weight and came to molting time in better condition than those on any other ration.

"Bone meal did not seem to be as necessary when skim milk was fed, as pens 13 and 24 gave good returns during the second period. The mash for the former was corn meal and wheat bran and for the latter corn meal only. . . .

"Lime furnished by oyster shells did not supply the deficiency of ash in some of the rations, as all pens had oyster shells available at all times."

[Poultry experiments], W. P. BROOKS, E. S. FULTON, and E. F. GASKILL (*Massachusetts Sta. Rpt. 1909, pt. 1, pp. 44, 45*).—The moist mash system of feeding poultry was continued during the year, and in 4 out of 6 experiments proved to be superior to the dry feed. Averaging the results of 3 experiments in summer and 3 in winter, the number of eggs laid daily per 100 hens was 36.3 eggs on the moist mash and 34.5 eggs on the dry ration.

Poultry raising, W. E. VAPLON (*Colorado Sta. Bul. 164, pp. 3-14*).—This is a bulletin of information relative to the conditions for successful poultry raising in Colorado, and is the result of a study of methods practiced among expert poultrymen of the State. The chief topics are location of the poultry farm, breeds, feeding, incubation, marketing, records and accounts, and poultry buildings.

Productive qualities of fowls, J. DRYDEN (*Oregon Sta. Circ. 10, pp. 16*).—A lecture given at the poultry section of the Graduate School of Agriculture, 1910, which discusses the characters desirable in fowls kept for egg production. The American Standard of Perfection is criticised, as it does not consider egg yield in its scale of points.

Biology, C. LETOURNEAU (*La Biologie. Paris [1910], pp. XI+506, figs. 113*).—This is a book on general biology and treats of the chemical constitution of living matter, the physiology of the cell, motility, nutrition, assimilation, growth, generation, innervation, and the physical forces involved in the life of both plants and animals.

The biological writings of Samuel Butler and their relation to contemporary and subsequent biological thought, M. HARTOG (*Sci. Prog. Twentieth Cent., 5 (1910), No. 17, pp. 15-37*).—Besides a review of Butler's works there are extended notices of recent writings on heredity by Semon, Jennings, Driesch, and other investigators. The author draws the inference that in recent years there has been a growing tendency to accept some form of the memory theory of heredity because at present the problem of heredity can only be elucidated by the light of mental and not material processes.

The geometrical relation of the nuclei in an invaginating gastrula (e. g. Amphioxus) considered in connection with cell rhythm, and Driesch's conception of entelechy, R. ASSHETON (*Arch. Entwickl. Mech. Organ., 29 (1910), No. 1, pp. 46-78, figs. 9*).—After a review of recent investigations on the mechanics of the invagination process, the author concludes that cell division can not be explained on purely physical and chemical grounds, but states that if we are to have a vitalistic theory instead of a mystical conception, it must be based on some principle which can be studied by mathematical methods.

"If we regard cell division in a general way, apart from the details of the process, we are led to conclude that there is an evolution of some form of energy within the cell which may very well be peculiar to living matter, showing, or appearing to show, alternately unipolar and bipolar states, the latter in most cases resulting in the complete separation of the portions of protoplasm dominated respectively by either pole. It is not inconceivable that although the two poles within the cell repel one another, yet in the real or apparent unipolar state one cell as a whole may attract another cell."

Chromosomes and heredity, T. H. MORGAN (*Amer. Nat., 44 (1910), No. 524, pp. 449-496, fig. 1*).—After weighing the evidence afforded by recent investigations on the function of the chromosome the following conclusions are reached:

"The essential process in the formation of the two kinds of gametes of hybrids in respect to each pair of contrasted characters is a reaction or response in the cells, and is not due to a material segregation of the two kinds of materials contributed by the germ cells of the two parents. The reaction differs in the germ cells of the hybrid from that of either of the parental types because the material basis of the germ cells differs owing to its dual origin. The results are due, however, to difference in reaction and not to a separation of mixed materials. The general point of view that underlies this conclusion is epigenetic, while the contrasting view, that of separation of materials, is essentially one of preformation. . . .

"The old view that sex is determined by external conditions is entirely disproved, and we have discovered an internal mechanism by means of which the equality of the sexes where equality exists is attained. We see how the results are automatically reached even if we can not entirely understand the details of the process."

The logic of chance in problems of genetics, A. S. DEWING (*Amer. Nat., 44 (1910), No. 525, pp. 567–571*).—The word "chance" has so many different meanings in biological literature that the author presents a formula by which a definite usage of the term "chance" may be established.

"In problems of genetics the occurrence of an event said to be due to chance may be ascribed to two separate but independent sets of conditions. The internal conditions are those which are entirely confined to the original universe of discourse of the problem—as for instance, the conditions of the gametes in the chance union of a Mendelian hybrid. The external conditions are those which are not centered in the immediate elements. They are such as age, strength, and the like, of the gamete producing animals. Let ϕ represent the chance occurrence of any event, and let $a, b, c, \ldots$ represent a series of internal conditions either known or unknown, and let the coefficients A, B, C, . . ., etc., represent the intensive value of a, b, c in determining the result. Similarly let m, n, o represent certain external conditions and M, N, O their coefficient of intensive value. Then the formula for the chance occurrence, ϕ, of an event becomes $\phi=f\ (Aa, Bb, Cc \ldots Mm, Nn, Oo \ldots)$."

The application of this formula in three different uses of the term in genetics is illustrated by examples.

DAIRY FARMING—DAIRYING.

The bacteriology of commercially pasteurized and raw market milk, S. H. AYERS and W. T. JOHNSON, Jr. (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 126, pp. 98, figs. 16*).—A study of the bacterial flora of commercially pasteurized and raw milk. Both kinds of milk were examined when fresh and on each succeeding day, as long as the milk was fit for consumption, in order to study the rise and fall of the various groups of bacteria.

Experiments were made with milk by the "flash" and "holder" methods of pasteurizing in the laboratory, where the process could be controlled. Raw milk high in bacteria as it was produced for butter making was heated in a small pasteurizer of the "flash" type for from 30 to 40 seconds at different temperatures and then cooled. The bacterial production varied at the same temperature with different samples, due it is thought, not to careless methods of controlling the temperature or to contamination, but to the varying proportion of heat-resisting species of bacteria or to bacteria in the spore form. When held at 10° C. the proportion of peptonizing bacteria was very low for from 3 to 4 days. Held at room temperatures, 22 to 25°, the raw milk in one series remained sweet until the second day. The pasteurized milk soured with normal acid curds on the third day. In the second series, where the counts were all higher, both the raw and the pasteurized milk soured in 24 hours with solid curds and a little gas. These experiments indicated that pasteurization does not prevent milk from souring, but merely delays the process.

A few experiments were made in using the "holder" process for pasteurizing. The milk was heated in the same "flash" machine used in the preceding experiments, from which it flowed into a steamed-covered can where it was held at 2° lower than when pasteurized. Twenty minutes' holding was found to be almost as efficient as the 40 minutes' holding. Another experiment was carried out under the same conditions, except that the milk was pasteurized in a jacketed can and held for varying lengths of time. Two samples heated to 60° and held for 40 minutes and 2 samples heated to 65.6° all curdled with an acid curd in 48 hours, when held at room temperature. On the other hand, one of the 2 samples heated to 71.1° curdled with a rennet curd after 24 hours at room temperature, while the other curdled after 48 hours with an acidity of 0.41 per cent and was partly digested.

"These experiments show that a high temperature for a considerable period is required to prevent souring. It is evident, too, that peptonizing bacteria are of no more importance than in raw milk, for the milk must be held 4 or 5 days before their numbers in pasteurized milk are as great as those in raw milk. The results also indicate that milk always sours when pasteurized under conditions that would prevail in commercial work, although the souring is delayed."

An examination of the pasteurized milk of a small city showed that at the time the consumer would receive it the average group proportion was: "Peptonizers, 9.92 per cent; lactic-acid bacteria, 56.76 per cent; alkali and inert forms, 33.97 per cent. After holding 24 hours at room temperature the proportion of acid bacteria rapidly increased to 99.03 per cent, while the alkali or inert forms decreased to 0.19 per cent and the peptonizers to 1.14 per cent. The average acidity was 0.64 per cent, indicating a sour milk."

Studies of commercially pasteurized milk obtained from the regular milk supply of Boston and New York also showed that commercially pasteurized milk always sours because of the development of lactic-acid bacteria, which, on account of their high thermal death point survive pasteurization, and perhaps in some cases because of subsequent infection with acid-forming bacteria during cooling and bottling.

The results in this paper hold only for commercially pasteurized milk heated from 60° to 65.6° in the "holder" process, or up to 71.1° in the flash process. It is pointed out that it is not reasonable to expect the use of high temperatures in commercial pasteurization. At the above temperatures milk, when heated under commercial conditions, may be expected eventually to sour, and the bacterial content will be comparable to the average group curves for pasteurized milk as shown in this paper. These temperatures would be sufficiently high to afford protection against pathogenic bacteria and yet would probably leave in the milk the maximum proportion of lactic-acid bacteria and the group proportions would be very similar to those of all grades of market milk. If higher temperatures are used a degree of heat may be reached which will result in the destruction of all but spores, which, when allowed to develop, will undoubtedly produce peptonization of the milk.

"The relative proportion of the groups of peptonizing, lactic acid, and alkali or inert bacteria is approximately the same in efficiently pasteurized milk as it is in clean raw milk. In both cases the alkali or inert forms constitute the largest group, the lactic-acid bacteria next, while the peptonizers are in the minority. When both of these milks—the efficiently pasteurized and clean raw milk—are held, the group relations change; but if the changes which take place are compared it will be found that they are the same in each. At the time of souring, the group proportions have changed so that the lactic-acid bacteria constitute the largest group with the alkali or inert forms next in order and the peptonizers in the smallest proportion as initially. In both of these milks the group of peptonizers may increase slightly in its proportion to the other two groups during the first two days, but it then gradually decreases and always forms the smallest group.

"When milk is less efficiently pasteurized the position of the groups may be reversed so that the lactic-acid bacteria constitute the largest group with the alkali or inert forms next in order, but here again the peptonizers form the smallest proportion of the total bacteria. This group arrangement is the same in a dirty raw milk.

"The more efficient the pasteurization, the smaller the percentage of lactic-acid bacteria; and, similarly, the cleaner the raw milk, the smaller the percentage of lactic-acid bacteria.

"The peptonizing bacteria are present in smaller numbers in the inferior grades of commercially pasteurized milk during the first twenty-four hours after receiving than in raw milk of the same quality, and the peptonizers may increase to slightly higher numbers in the pasteurized milk when held several days than in the raw milk of high initial lactic-acid bacteria content; but it should be remembered in this connection that milk is usually consumed within twenty-fours hours after delivery. The number of peptonizers in a good grade of commercial pasteurized milk on the initial count and on succeeding days is approximately the same as in a clean raw milk when held under similar temperature conditions.

"All milk, whether pasteurized or raw, must necessarily be infected during cooling and bottling by bacteria in the receiving tanks, in the pipes, on the cooler, and in the bottles; but the low bacterial counts obtained from pasteurized milk in these investigations show that the reinfection must have been very small. . . .

"The 'holder' process of pasteurization is superior to the 'flash' process. With the 'holder' process a high efficiency may be obtained with a low temperature, while to obtain the same efficiency with the 'flash' process a high temperature would be required. A temperature of 62.8° C. (145° F.) for 30 minutes seems best adapted for efficient pasteurization. . . .

"Pasteurization should always be under the control of competent men who understand the scientific side of the problem. It is believed that ignorance of fundamental bacteriological facts often accounts for inefficient results rather than a willful lack of care on the part of the dairyman."

The daily variation in the bacterial content of raw and pasteurized milks during the incubation period is presented in tabular form. References to the literature on the subject are appended.

The bacteriology of soured milk, R. T. Hewlett (*Brit. Med. Jour., 1910, No. 2603, pp. 1584–1586*).—This article is concerned with the methods of preparation and administration of soured milk in lactic-acid therapy.

The fermentation of citric acid in milk, A. W. Bosworth and M. J. Prucha (*New York State Sta. Tech. Bul. 14, pp. 43–48*).—A study of the disappearance of citric acid in sour milk.

Milk containing 0.224 gm. citric acid was found to be free from the acid in 60 hours. In order to determine whether the citric acid could be fermented under conditions other than those present in milk, 5 gm. of calcium citrate were placed in 4 flasks containing 500 cc. of bouillon and 1 per cent of lactose. After sterilizing, 2 flasks were kept for checks and into each of the other 2 flasks 1 cc.

of buttermilk was introduced. The flasks were shaken every morning and evening. It was noticed that the calcium citrate in the flasks to which the buttermilk was added was slowly going into solution, and on the twelfth day no insoluble citrate remained. An examination showed the checks to be sterile, and with the calcium citrate still on the bottom of the flasks as an insoluble powder.

Further experiments showed that the volatile acid in sour milk was derived from citric acid and proved to be acetic acid. Of several common dairy bacteria tried, *Bacterium lactis aërogenes* was the only one found to have the power of fermenting citric acid, and this produced two molecules of acetic acid for every one of citric acid. In the process of cheese making the citric acid all disappears before the cheese is put in the press. In one cheese examined the milk used contained 0.203 gm. citric acid per 100 cc.; the whey when drawn containd 0.118 gm.; the first whey from the press contained none; the curd when the whey was drawn contained a trace; and the curd when put in the press contained no citric acid.

On the influence of feeds poor in lime upon the lime content of cow's milk, L. Frank (*Chem. Ztg., 34 (1910), No. 111, pp. 978, 979*).—The milk from 10 cows fed hay from sewage meadows which were deficient in lime contained on an average 0.1576 per cent of calcium oxid. The average percentage in milk from cows fed similar rations supplemented by ground chalk was 0.1595.

Composition of dog's milk, L. S. Dijkstra (*Molk. Ztg. [Hildesheim], 24 (1910), No. 79, p. 1494*).—Analysis of the milk of a female house dog 6 days after parturition gave the following percentages: Fat 7.25, protein 6.65, sugar 2.85, ash 0.96, water 82.29. A second analysis 14 days later gave the following: Fat 5.65, protein 6.95, sugar 2.25, ash 1.04, water 84.11. There was less volatile fatty acids and potassium and more phosphorus than in cow's milk. Casein constituted about one-half the nitrogenous constituents.

Feeding for milk production, C. H. Eckles (*Missouri Sta. Circ. 44, pp. 69–84, figs. 3*).—This contains information of a popular nature concerning the feeding of dairy cows. The principal topics treated are turning on pasture in the spring, grain feeding while on pasture, providing for periods of short pasture, winter feeding, reasons for feeding balanced rations, home grown balanced rations, succulent feeds, the silo, and buying concentrated feeds.

The cost of producing market milk, J. B. Lindsey (*Massachusetts Sta. Rpt. (1909), pt. 2, pp. 27–31*).—A résumé of the food cost in 1907 and 1908 of the station herd, consisting of grade and pure bred Jersey cows producing 5 per cent milk.

"The average yield per cow for the 7 cows in 1907 was 5,874.4 lbs., the food cost per cow was $78.19, and the cost of a quart of milk 3 cts. In 1908, the yield per cow in case of 9 cows was 5,639.5 lbs. (2,564 qts.), the food cost per cow $82.21, and the food cost per quart of milk 3.3 cts."

If other items of cost are added it is believed that the total cost of producing milk satisfactory in sanitary quality and containing from 4 to 5 per cent of butter fat will usually be found to amount to from 4 to 5 cts. per quart. The cost of keeping 1 cow for 1 year is estimated at $137.07. Milk produced under more than average sanitary conditions or certified milk will naturally cost considerably more than the figures presented in these estimates.

The Illinois competitive cow test, C. C. Hayden (*Illinois Sta. Circ. 144, rev., p. 12*).—This outlines the plan and rules which govern the state competitive cow test.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 628, 629, 632, 638, p. 1 each*).—These relate to the adulteration of milk.

Reading the Babcock test, P. H. Smith (*Massachusetts Sta. Rpt. 1909, pt. 1, pp. 142–147*).—Six bottles, having as wide a diversity in size of neck as could be brought together, were used to test variation in methods of reading the test. Pure butter fat was weighed into the bottles, which had been washed out with ether to remove all traces of fat, and enough hot water added to make 18 gm. The bottles were then placed in the Babcock tester and whirled 3 times, for 5, 3, and 2 minutes respectively, as for the regular test. The results were as follows:

"With one exception the readings taken to the top of the upper meniscus were too high, the amount of error being in most cases proportional to the diameter of the bottle neck. Where the readings were taken to the bottom of the upper meniscus the results were much more uniform. In several cases, however, there was considerable variation, due very likely to the difficulty of determining accurately the lowest point of the upper meniscus.

"The alcohol method, where used, showed more concordant results, especially for the 10 and 30 per cent bottles. The difference between these results and the theoretical test was no greater than might be expected between duplicate tests by the gravimetric method. The tests made in the 50 per cent bottles varied materially, which might reasonably be attributed to the difficulty of reading these bottles accurately on account of the large diameter of the neck."

Further tests were then made in reading mixtures of butter fat and skim milk. "As in the former trials, reading to the top of the meniscus gave high results, proportional in most cases to the diameter of the graduated neck; reading to the bottom of the meniscus gave results more nearly corresponding to theory, while the results with the alcohol method were quite uniform and consistent. The high results obtained by attempting to read to the bottom of the meniscus in the case of the three cream bottles was due to the cloudiness of the fat, which made an accurate reading difficult, if not impossible. . . . With our present knowledge, and pending further investigation, the writer would advocate reading the tests made in 10 per cent milk bottles from the bottom to the extreme top of the fat column, including the maniscus, as is now generally practiced; while for 30 per cent 6-in. Connecticut cream bottles the reading should be taken from the extreme bottom of the fat column to the bottom of the upper meniscus, preferably by the use of alcohol, as described by Eckles or Farrington."

[Dairy inspection], P. H. Smith (*Massachusetts Sta. Rpt. 1909, pt. 1, pp. 63–68*).—This is a brief report of the work of the station in testing glassware, inspecting Babcock machines, examining candidates for proficiency in Babcock testing, analyzing milk and drinking water, and testing pure-bred cows. The text of a section of the dairy laws amended by the legislature in 1910 is given, whereby the director of the station is given power to revoke the certificate of an operator of the Babcock test who is not doing satisfactory work. Of 4,071 pieces of glassware examined at the station, 1.06 per cent were found to be inaccurate.

Directions for testing milk on the farm, H. E. McNatt (*Missouri Sta. Circ. 41, pp. 57–60, figs. 8*).—Popular directions for using the Babcock test for milk are given.

Farm butter making, H. M. Bainer (*Colorado Sta. Bul. 163, pp. 3–16, figs. 8*).—This contains detailed directions for making a good quality of butter on the farm under Colorado conditions.

Creamery butter making, A. G. Shirley (*Jour. New Zeal. Dept. Agr., 1 (1910), No. 4, pp. 242–264, figs. 2*).—An account of modern methods of making butter in New Zealand creameries.

Notes on the formation and working of cooperative dairy factory companies, W. E. GWILLIM (*Jour. New Zeal. Dept. Agr., 1 (1910), No. 1, pp. 28–65, figs. 4*).—The progress of the dairy industry, advantages of cooperative dairying, cost of equipping butter and cheese factories, and the by-laws of a dairy association are the topics treated in this article.

Mottled butter, H. H. BURTON ET AL. (*N. Y. Produce Rev. and Amer. Cream., 31 (1910), No. 2, pp. 42, 44, 46*).—A classification of the causes of mottled butter, with comments thereon.

Tests of parchment paper as a wrapping for butter, A. BURR and A. WOLFF (*Abs. in Analyst, 35 (1910), No. 415, pp. 435, 436; Molk. Ztg. [Hildesheim], 24 (1910), No. 94, pp. 1765–1767*).—This is an abstract of an article previously noted from another source (E. S. R., 23, p. 616).

The inference that may be drawn from these investigations for the practical butter maker is that a good parchment paper should contain not more than 8 per cent of sugar, 10 per cent of substances soluble in water, and 4 per cent of mineral matter. The best safeguard is to give the paper a preliminary treatment with hot and then with cold brine.

There are numerous references to other investigations on this subject.

Cheese: Its position in history, commerce, and dietetics, R. J. BLACKHAM (*Jour. Roy. Sanit. Inst., 31 (1910), No. 10, pp. 440–450*).—A popular article on the varieties, manufacture, nutritive value, and examination of samples of cheese.

Improved methods for making cottage and Neufchatel cheese, J. MICHELS (*North Carolina Sta. Bul. 210, pp. 29–38, figs. 8*).—Details are given for using pure cultures of lactic-acid bacteria in making cottage and Neufchatel cheese on a commercial scale.

Dairying industry in foreign countries, H. D. BAKER ET AL. (*Daily Cons. and Trade Rpts., 13 (1910), No. 127, pp. 809–817*).—These reports include accounts of the growth of the dairying industry in Canada, Australia, Holland, and Sweden.

VETERINARY MEDICINE.

Reports on the subjects discussed in the general meetings [at the Ninth International Veterinary Congress] (*Trans. IX. Internat. Vet. Cong. The Hague, 1 (1909), pp. 789, pls. 3, figs. 6*).—The papers presented include discussions of the following subjects: Combating hog cholera and swine plague by the veterinary police, by M. Dorset, F. Hutyra, R. Ostertag, and S. Stockman (see page 284); the protection of the practice of veterinary medicine, by P. Cagny, V. Kotlár, and M. Preusse; the rôle of the veterinary surgeon as an expert in zootechnical questions, by G. Elsner, C. Matthiesen, Lavalard, and P. P. Van Der Poel; requirements for the doctorate in veterinary science, by F. Hutyra, E. Leclainche, and R. Schmaltz; the sanitary control of milk and the obligatory systematic inspection of meat, by R. Edelmann, H. Martel, A. D. Melvin, Porcher, H. Rievel, and A. M. Trotter; the methods employed in treating the carcasses and meat with the object of rendering them harmless, by A. Moreau, F. Puntigam, and Zwick; the prophylaxis and pathology of protozoan diseases (piroplasmosis, trypanosomiasis) with demonstration of the specific parasites and of the transmitting animals (ticks, mosquitoes, etc.), by E. Dschunkowsky and J. Luhs, P. Knuth, J. Lignières, C. S. Motas, C. A. Penning, P. Bey, and A. Theiler (E. S. R., 22, p. 386); the governmental control of sera and bacterial products and their preparation by the government, by E. Leclainche, H. E. Reeser, and C. Titze; avian tuberculosis in its relation to tuberculosis in mammalia, by S. Arloing, O. Bang, and J. R. Mohler and H. J. Washburn; the sterility of cows and its relation to infectious diseases of the genital organs, by Albrechtsen and E. Hess (see page 284); governmental efforts against tuberculosis with regard to the ways of infection in this disease, by B. Bang, J. R. U. Dewar, R. Ostertag (see page 283), and J. Poels; and construction and interior of stables in relation to the prophylaxis of diseases of animals, especially tuberculosis and also to milk hygiene, by Dammann, H. M. Kroon, and J. S. Lloyd.

The reports or abstracts thereof are in English, German, and French.

Reports on the subjects discussed in the meetings of the sections [at the Ninth International Veterinary Congress] (*Trans. IX. Internat. Vet. Cong. The Hague, 2 (1909), pp. 1023, figs. 9*).—The subjects and authors reporting at the meeting of the sections are as follows: Inspection of fish, game, poultry, crustaceous animals and mollusks and of other animal foods in relation to the hygiene of man, by E. Césari and O. Oppenheim; insurance of stock in relation to obligatory meat inspection, by R. Edelmann, A. Pirocchi, and F. Hendrickx; disinfection of the vehicles of transport and animal products in international traffic, by A. Conte and A. A. Overbeek; serotherapy, seroprophylaxis and vaccination in foot-and-mouth disease and the value from the point of view of legal sanitary police, by E. Leclainche and H. Vallée, F. Loeffler (see page —), L. F. D. E. Lourens, and E. Perroncito; the diagnosis of infectious diseases by means of the recently discovered reactions of immunity (except the subcutaneous injection of tuberculin and mallein), by L. De Blieck, J. Lignières, L. Panisset, J. Schnürer, and Schütz; etiology and pathogeny of malignant tumors, especially of cancer, by H. Apolant, E. F. Bashford, and A. Jaeger; vaccination against tuberculosis, by E. Eber, J. F. Heymans, M. Klimmer, H. Vallée, Schutz, and S. Arloing; anatomo- and histo-pathological diagnosis of rabies, by L. Frothingham, R. Hartl, and S. von Rátz; specific chronic enteritis of cattle, by B. Bang (see page 283), J. Bongert, E. Liénaux, H. Markus, Miessner, and W. Stuurman; infectious pleuro-pneumonia of horses, by Malkmus, J. Szpilman, M. G. Tartakowsky, and D. Koneff; hemostasis in the modern methods of castration, by A. Degive, H. Frick, A. Labat, J. Macqueen, B. Plósz, J. Vennerholm, and B. Vrijburg; pathology and therapeutics of streptococcic infections in the domestic animals, by A. Labat, J. Lignières, E. Pison, and R. Torro; chronic arthritis deformans in horses, by M. J. Jacoulet and G. Joly; physiology of milk secretion; relation between the external form of cows and the production of milk, by P. Godbille and C. Kronacher; influence of the various foods upon the quality of the products (meat, milk) and application of Kellner's principles in the feeding of animals from the point of view of the production of milk, meat, and strength, by F. Maignon and S. Weiser; prevention of the prejudicial effects of the forced breeding for special purposes, by Dammann; teaching of zootechny, by P. Dechambre, A. W. Heidema, and J. Rudovsky; hygiene in the maritime transport of cattle, by L. J. Hoogkamer and W. Rickmann; sanitary police in colonies, by J. A. Gilruth, C. A. Penning, and W. Rickmann; and teaching and laboratories for research in tropical diseases, by L. De Blieck, J. K. F. De Does, P. Knuth, and H. Vallée.

The reports or abstracts thereof are in English, German, and French.

Resolutions of the Ninth International Veterinary Congress at The Hague, September 13–19, 1909 (*[1910], pp. 61*).—The resolutions adopted by the Congress are presented in French, German, and English.

Examination of the teeth and dental caries, H. HOLTERBACH (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 33, pp. 652–655*).—This is a general discussion in regard to the status of veterinary dentistry at the present day.

Antiproteolytic substances in urine and serum, J. BAUER (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 5 (1910), No. 2–3, pp. 186–200; abs. in Zentbl.*

Biochem. u. Biophys., 10 (1910), No. 4, p. 183).—The so-called antitrypsin which occurs in urine and blood serum is not a specific body but a complex of colloidal active substances. In experimental nephritis an excess of antitrypsin is excreted. Serum antitrypsin was not increased by immunizing tests, but on the other hand, an increase was noted when the ureters were tied or the kidneys extirpated.

Investigation in regard to the bactericidal power of the leucocytes, C. A. KLING (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 7 (1910), No. 1-2, pp. 1-93, pl. 1*).—By heating polymorphonuclear leucocytes for one-half hour at 50° C. in bouillon, at 37 to 38° in dilute hydrochloric acid or sodium hydrate, or by repeated freezing and thawing, the endolysins are extracted from the protoplasma. Endolysins destructive to the *Bacillus subtilis* or *typhosus* could not be obtained by digesting in bouillon, salt solution, or in 5 per cent inactivated serum for one-half hour at 37°. The extract of polymorphonuclear leucocytes from rabbits, guinea pigs, and cats was capable of destroying the timothy hay bacillus, the grass bacillus II, Korn's acid-fast bacillus I, and Rubner's butter bacillus. Rabbit leucocyte extracts behave in a like manner toward the tubercle bacillus Arloing and the human type of tubercle bacillus. The living polymorphonuclear leucocytes do not when inoculated into the guinea pig lessen the virulency of the human tubercle bacillus.

Serotherapy, seroprophylaxis, and vaccination against foot-and-mouth disease, and their value for the veterinary inspector, F. LOEFFLER (*Deut. Med. Wchnschr., 35 (1909), No. 48, pp. 2097-2101; abs. in Hyg. Rundschau, 20 (1910), No. 15, pp. 840, 841*).—A report read at the International Veterinary Congress held at the Hague in 1909, which deals with the progress made in combating foot-and-mouth disease among hogs, calves, and sheep during the last few years. The value of the immunizing serum is discussed.

Hypo- and histo-eosinophilia in foot-and-mouth disease, G. VALLILLO (*Clin. Vet. [Milan], Sez. Sci., 33 (1910), No. 1-3, pp. 1-9; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 34, p. 671*).—The author determined that in the exanthematous stage of foot-and-mouth disease a hypoeosinophilia took place, while in the areas of the body where the disease is localized or where the virus is discharged without any visible lesions (rennet stomach and intestines) a hypereosinophilia is present.

Diagnosis of glanders with the complement binding method, J. DE HAAN (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 32, pp. 633-638*).—This is a study of the circulation of antibodies in the blood serum of glandered horses in Java.

The author shows on the basis of his tests, bacteriological examinations, and autopsies that the examination of the serum for antibodies has almost the same value as the mallein test, but considers that when a negative antibody reaction is obtained and a positive mallein reaction the benefit of the doubt is to be given the mallein test.

The treatment of suppurative conditions in animals by bacterial vaccines, including a preliminary report of the use of a hyperimmune serum in canine distemper, J. M. PHILLIPS (*Amer. Vet. Rev., 36 (1910), No. 6, pp. 656-671*).—The author describes his (and McCampbell's) method for preparing autogenous bacterial vaccines. This consists of making 24-hour cultures on agar slopes of the material taken directly from lesions and then suspending the growth in a 0.85 per cent sodium chlorid solution preserved with 0.5 per cent carbolic acid. The author makes use of McFarland's nephelometer [a] for obtaining the proper dilution of the bacteria.

---

[a] Jour. Amer. Med. Assoc., 49 (1907), pp. 1176-1178.

The treatment and results of 31 horses with fistulous withers, 2 of which had also poll-evil, are given. Twenty-seven of the horses made a complete recovery. "The shortest length of time required for healing was 2 weeks, and this was a bad case of a year's duration, and the longest 11 weeks. Most of the cases lasted about 7 weeks. In one case the fistula recurred in about 7 months."

Work in regard to foot canker and the treatment of canine distemper with a hyperimmune serum are also reported.

About the complement binding and rabicidal substances in the blood of rabid animals, S. Kozewaloff (*Centbl. Bakt. [etc.], 1. Abt., Orig., 54 (1910), No. 6, pp. 564–566; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 14, p. 670*).—A serum from animals infected with "serum fixe" contained no complement binding nor rabicidal substances.

Rabies, G. H. Glover and B. F. Kaupp (*Colorado Sta. Bul. 162, pp. 8, figs. 4*).—This is a popular account of the disease. It is said that the recent outbreak of rabies in Colorado was started about 2 years ago at Greeley by a dog brought from the East.

One protective vaccination with antitetanin is usually sufficient, Pécus (*Jour. Méd. Vét. et Zootech., 60 (1909), Oct., pp. 591–593; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 34, p. 671*).—Observations were made on 1,500 immunized horses, 500 of which had injuries due to stepping on nails. In no instance were symptoms of tetanus present. Particular attention is called to the use and antiseptic value of tincture of iodin for resisting the activities of the tetanus spores and toxin.

Passive anaphylaxis, with particular reference to the endotoxin of the tubercle bacillus, G. Finzi (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 23, pp. 1099, 1100*).—The serum of horses, which was rendered hypersensitive by long immunizing with the tuberculous endotoxin, was capable of conferring passive anaphylaxis on guinea pigs and rabbits.

The significance of tuberculosis opsonin for immunity, E. Ungermann (*Arb. K. Gsndhtsamt., 34 (1910), No. 3, pp. 286–292, figs. 2*).—The work indicates that the real significance of the opsonic serum bodies against tuberculosis has not been established and that further work must be done in this direction.

About antitubercular vaccination in cattle, J. F. Heymans (*Arch. Internat. Pharmacod. et Thér., 20 (1910), No. 1–2, pp. 147–156; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 47 (1910), No. 7–8, pp. 251, 252; Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 5 (1910), No. 16, p. 629*).—A report of the vaccination of 4,000 cattle in 192 barns by Heyman's method (E. S. R., 20, p. 1188), in the first precinct of Southeast Flanders. The results obtained were encouraging.

The solution of tubercle bacilli in neurin, Lindemann (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 7 (1910), No. 1–2, pp. 191–196*).—Neurin (trimethylvinylium hydrate) dissolves the tubercle bacilli partly but not completely.

Tuberculosis of the tongue, J. Pillmann (*Ztschr. Fleisch u. Milchhyg., 20 (1910), No. 4, pp. 128, 129; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 47 (1901), No. 7–8, p. 204*).—The author reports 2 cases of tongue tuberculosis in cattle. Both animals, however, were affected with generalized tubercolosis.

Combating tuberculosis by the government, with particular regard to the sources of infection, B. Bang, J. R. U. Dewar, R. Ostertag, J. Poels, Bongert, and Dammann (*Trans. IX. Internat. Vet. Cong. The Hague, 1 (1909), S. G. XI, 1, pp. 19; 2, pp. 10; 4, pp. 16; 5, pp. 12; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 38, pp. 741–744*).—A general discussion of the subject.

Specific chronic enteritis of cattle (Enteritis pseudo-tuberculosa bovis, Johne's disease), B. Bang (*Trans. IX. Internat. Vet. Cong. The Hague, 2 (1909), S. III, 1, 1, pp. 27*).—Following a review of the literature relating to this disease in which it is shown to be spread over many countries of Europe and North America, accounts are given of the pathological alterations, symptoms and course of the disease, and experimental investigations personally conducted.

Medicinal treatment seems to have only a transitory influence, although on account of the spontaneous recovery that often occurs, it is difficult to judge its value. The author has been unable to cultivate the bacilli that cause the disease and inoculation experiments on small animals as a rule proved unsuccessful. Whether the disease is spread from animal to animal through contamination of the food by the bacilli in the excrements, or whether it can likewise be caused by saprophytic bacilli, was not decided. The importance of the discovery by the author's cooperator, O. Bang, of an apparently trustworthy diagnostic agent in tuberculin prepared from avian tubercle bacilli (E. S. R., 22, p. 287) is emphasized.

The sterility of cows and its relation to the infectious diseases of the genital organs, ALBRECHTSEN and E. HESS (*Trans. IX. Internat. Vet. Cong. The Hague, 1 (1909), S. G. X. 1, pp. 14–16; 3, pp. 18; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 39, p. 760*).—A discussion in regard to the causes of sterility in cattle.

Dropsy of the amniotic sac in cattle, JOACHIM (*Mitt. Ver. Bad. Tierärzte, 9 (1909), No. 6, pp. 90–93; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 29, p. 583*).—A description of 4 cases, in 3 of which it was necessary to slaughter the animals despite the fact that artificial abortion was produced. The fourth animal survived.

Combating hog cholera and swine plague by the veterinary police, M. DORSET, F. HUTYRA, R. OSTERTAG, and S. STOCKMANN (*Trans. IX. Internat. Vet. Cong. The Hague, 1 (1909), S. G. I, 1, pp. 11; 2, pp. 22; 3, pp. 17; 4, pp. 14; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 37, pp. 727–729*).—These papers have particular reference to preventing hog cholera and swine plague in the light of the newer researches.

About Krafft's vaccine: A reply, K. POPPE (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 34, pp. 667, 668*).—On the basis of his new researches (E. S. R., 23, p. 486), the author insists that Krafft's vaccine against swine plague with rabbits and guinea pigs does not furnish a protection against *Bacillus suisepticus*.

Meningo-encephalitis (blind staggers), T. P. HASLAM (*Kansas Sta. Bul. 173, pp. 235–251*).—This disease, commonly known as staggers, blind staggers, sleepy staggers, and mad staggers, has occurred in outbreaks of greater or less severity in many sections of the United States, particularly in Kansas, Texas, Louisiana, North Carolina, Delaware, and Arkansas.

A severe outbreak of the disease in Kansas was investigated at the station in 1891 by Mayo, who attributed it to *Aspergillus glaucus*, which had badly damaged the small crop of corn grown that year because of dry weather. In 1902 and 1906 there were severe outbreaks in various portions of the State. There has also seemed to be a continual loss of horses from staggers in any locality in which much corn of an inferior grade is fed.

In investigations made during the outbreak in 1906, the author failed to find *A. glaucus* present but discovered 3 molds, *Mucor rhizopodoformis*, *Rhizopus nigricans*, and *Fusarium* sp. The details of the investigation, since continued by the author and Dr. P. J. Meenen, are reported. The conclusions drawn are as follows:

"Feeding horses upon immature corn badly infected with molds and worm dirt, with its accompanying bacteria, produces typical cases of staggers. The extract of such corn is rapidly fatal to rabbits. *A. flavus*, *A. niger*, and *R.*

nigricans have been found abundantly on the corn only in localities which lose horses from staggers. Corn containing any molds should be thoroughly cleaned or 'floated' before feeding. Mixing corn with bran and oats seems to lessen the danger. Treatment to be effective must be begun early."

The complement binding reaction in equine pneumonia, W. PFEILER (*Arch. Wiss. u. Prakt. Tierheilk., 36 (1910), Sup., pp. 423–435*).—The author was able to prepare, by a method which is described, an antigen which was capable of stimulating the production of complement-deviating substances in the animal body. A serum was produced which was capable of producing a deviation of complement for the *Diplo-streptococcus pleuro-pneumoniæ* of Shütz.

Summer sores of horses.—Their treatment, V. DROUIN (*Rev. Gén. Méd. Vét., 15 (1910). No. 177, pp. 497–510; abs. in Vet. Rec., 23 (1910), No. 1159, pp. 183, 184*).—The author thinks it probable that the nematodes which cause this affection (*Filaria irritans*) gain access to the skin by local inoculation, in which insects may play a part. The numerous forms of treatment which have been attempted are discussed. Of these the author places most confidence in excision of the diseased tissue.

Treatment of umbilical hernia in horses, M. CASPER (*Arch. Wiss. u. Prakt. Tierheilk., 36 (1910), Sup., pp. 19–36*).—Hernia umbilicalis is either inherited or acquired. The methods of treatment are divided into 2 stages, (1) the reduction of the hernia and its replacement by taxis; and (2) the retenton of the hernia in the abdominal cavity.

The actual treatment consists of either (a) the so-called palliative or non-radical operative methods, or (b) the radical operative methods. The first of these includes the application of a binder, the use of sinapisms, etc., or caustics the subcutaneous injection of sodium chlorid solution, the use of a truss, stitching up the orifice, and clamping. The second includes the various forms of radical operative measures.

Bone sequestrum in the forearm of a foal, KITT (*Arch. Wiss. u. Prakt. Tierheilk., 36 (1910), Sup., pp. 177–182, figs. 3*).—A description of an unusual case of traumatic necrosis of the diaphysis of the left forearm of a foal, in which a new bone was formed which sequestrated and enveloped the old radius.

Abstracts of work done in the laboratory of veterinary physiology (*N. Y. State Vet. Col. [Pub.] No. 7, pp. 36, pl. 1*).—This paper contains articles on Canine Tetanus, A Fly-Blown and Distempered Dog, and A Case of Auto-Enterectomy in the Bitch, by P. A. Fish; The Diastases in the Saliva of the Dog and Cat, by C. E. Hayden; and Blood Examination of Dermatoses in Dogs, by H. Welch.

A preliminary report of the bacterial findings in canine distemper, N. S. FERRY (*Amer. Vet. Rev., 37 (1910), No. 4, pp. 499–504*).—During the course of an investigation of this infection in which nearly 300 dogs suffering from an acute infection were studied and given post-mortem examination, the author was able to isolate an apparently new organism, the characteristics of which are here reported. He states that the disease was experimentally produced by artificial inoculation, and that with this organism a vaccine has been made which has given favorable results.

"Taking the disease in the early stages, I was able in almost every case to isolate the organism uncontaminated from the smaller bronchi, and often the trachea. Later in the disease, I could often isolate the organism from the smaller bronchi in pure culture, but from larger bronchi and trachea I would almost invariably get a contamination with one or more of the pus organisms. In the last stages the secondary or terminal infections would extend to the lungs, when it would then be more difficult and at times impossible to isolate the germs.

"Whether this organism is the cause of distemper remains to be proved. Out of 93 autopsies where the organism was isolated it was found in pure culture uncontaminated in 71 cases. In 15 cases it was isolated from the blood. In 12 cases the organism was found contaminated in the smaller bronchi with the staphylococcus. In 9 cases it was found associated with organisms other than the staphylococcus. In 2 cases where the organism was isolated the exact bacterial findings have been lost. In a few cases I have seen the organism in smears from the lungs, but was unable to isolate it or grow it."

About an epizootic goose disease, F. LOEFFLER (*Arch. Wiss. u. Prakt. Tierheilk., 36 (1910), Sup., pp. 289–298, pl. 1*).—A description of the clinical, anatomical, and bacteriological findings of an epizootic goose disease which occurred in 1904 at Klein-Kiesow, near Greifswald, Germany. The bacterium isolated practically simulated the one isolated by Riemer.[a]

A transmissible avian neoplasm (sarcoma of the common fowl), P. ROUS (*Jour. Expt. Med., 12 (1910), No. 5, pp. 696–705, pls. 3, chart 1*).—This paper reports the first avian tumor which has been capable of transplantation to other individuals. Throughout the process the sarcoma retained its characteristics and was infiltrative and destructive. It resembled the typical mammalian neoplasms that are transplantable.

Respiratory exchange in fowls with gout, G. DI GRISTINA (*Internat. Beitr. Path. u. Ther. Ernährungsstör. Stoffw. u. Verdauungskrank., 1 (1909), No. 1, pp. 29–47; abs. in Biochem. Centbl., 9 (1910), No. 17, p. 747; Chem. Abs., 4 (1910), No. 17, p. 2322*).—When fowls were fed food rich in nuclear protein the same condition of uremia and intoxication was produced as in man. Beef liver produced these conditions quicker than horse meat. A depressed oxidation and a lower respiration coefficient was observed in these birds. The feeding of corn did not alter the status.

Liver disease in poultry, G. B. MORSE (*Rel. Poultry Jour., 17 (1910), No. 7, pp. 680–682; 697–704, figs. 5*).—A popular, illustrated discussion in regard to the infectious, noninfectious, and doubtfully infectious liver diseases of poultry. Attention is called to the crude terms often applied to the various liver diseases and to the preventive measures and treatment thereof.

A guinea pig epizootic associated with an organism of the food poisoning group but probably caused by a filter-passer, G. F. PETRIE and R. A. O'BRIEN (*Jour. Hyg. [Cambridge], 10 (1910), No. 2, pp. 287–305*).—"An epizootic killing 90 per cent of a stock of 500 guinea pigs has been described; cultures from these guinea pigs frequently gave an organism indistinguishable by cultural or serological tests from the *Bacillus œrtryck* and the *B. suipestifer*. This organism was highly pathogenic when inoculated subcutaneously into guinea pigs and of low pathogenicity when given to them with food. Healthy contacts put with animals infected subcutaneously or fed with the bacillus did not die. Sterile filtrates of organs of guinea pigs of the infected stock administered by different methods frequently killed. The evidence definitely suggests that the essential infecting agent in the epizootic was a filter-passer."

Guinea pigs as chronic carriers of an organism belonging to the food poisoning group, R. A. O'BRIEN (*Jour. Hyg. [Cambridge], 10 (1910), No. 2. pp. 231–236*).—Five of the surviving guinea pigs mentioned in the account noted above, which showed definite immunity, proved to be carriers excreting the bacillus intermittently 5 months later and the serum of all of them agglutinated the bacillus.

---

[a] Centbl. Bakt. [etc.], 1. Abt., Orig., 37 (1904), No. 5, p. 641.

RURAL ENGINEERING.

Reclamation of the southern Louisiana wet prairie lands, A. D. Morehouse (*U. S. Dept. Agr., Office Expt. Stas. Rpt. 1909, pp. 415–439, pls. 5, figs. 6*).—This article is based on reports of investigations made during 1909 and 1910 by A. M. Shaw, W. B. Gregory, and C. W. Okey.

The formation of the alluvial lands is first taken up, the natural levees along the bayous and streams discussed, and profiles given illustrating some of the typical forms. The purpose of the investigations was to determine the volume of water, or percentage of the rainfall, which it is necessary to pump from the fields in order to secure adequate drainage of these soils; the area of the field surface occupied by ditches, and the depth, width, and arrangement of the ditches and levees required in a drainage system; the influence of bad physical condition of ditches upon the efficiency of the system; the distance from the ground surface at which the water table should be maintained; the difference in the level of the water in the ditches while the pumps were in operation; and the percentage of saturation or the quantity of water which the soil should contain when in the best condition for growing crops.

To carry out the investigations four reclaimed tracts of land were chosen, three equipped with pumping plants of ample capacity and the fourth having a gravity outlet. Rain gages were established on all of these tracts and by rating the pumping plants the amount of water removed during the course of a year was estimated, except in one case where the water was measured by means of a weir and automatic water register.

The results of measurements of rainfall and run-off show that for the months from June to December, 1909, inclusive, the average percentage of run-off to rainfall for the four tracts was 35, ranging from 43.7 to 9.99 per cent, the latter tract not including a 5-in. rainfall of the first part of June, and also not being as thoroughly ditched or in cultivation. Comparing the daily rainfall and run-off and also the daily pumping record for 1907 and 1908 for one plantation, it was found that during 1907 it took 14.8 hours' pumping for each inch of the 66.32 in. of rainfall, whereas in 1908 the pumps ran 12.9 hours per inch for the 51.06 in. of rainfall. This indicates that the uneven distribution of the rainfall throughout a year, as well as the fact that one part of the plantation may receive a very heavy precipitation during certain storms while only a small shower may affect the rest of the land, has but slight effect on the general yearly average, and that year by year the ratio of the necessary pumping to the rainfall will be fairly constant.

Methods of reclamation are considered under the heads of early methods, levees and seepage, canal systems, interior ditch systems, and pumping plants. Where a tract does not adjoin a bayou or other good outlet, it is necessary to construct outfall canals. The tract is next surrounded by a low levee to prevent flooding and ordinarily a large reservoir canal is constructed along the inside of the levee nearest the outlet, and at some convenient point on this canal the pumping plant is established. Connected with the reservoirs are collecting ditches of somewhat smaller size, and at right angles to these latter are lateral ditches which are still smaller. Ordinarily the main reservoir canals range in width from 30 to 60 ft. and in depth from 5 to 8 ft. The deeper the canal the greater storage capacity it possesses and the better outlet it furnishes for the collecting ditches or laterals. For the tracts under consideration this reservoir capacity amounted to from 0.1 to 0.4 in. of rainfall over the entire area. The proportion of land occupied by the interior ditch system varied from 3 per cent to nearly 6 per cent of the land surface. The collecting ditches range from 4 to 10 ft. in width and from 4 to 5 ft. in depth, while the lateral ditches in heavy soils are placed about 100 ft. apart and are dug some 3 ft. deep with a bottom width of 2 ft. and a top width of 4 ft. An open traction ditcher used for digging lateral ditches is illustrated.

Attention is called to the plant growths, particularly the water hyacinth, which frequently obstruct the ditch systems, often to the extent of practically making them useless for drainage purposes. Several methods for getting rid of this pest are mentioned.

Under pumping plants are noted the various types of pumping machinery in use, which was found to vary greatly. As the necessary water lift in the plantations of this section varies from 3 to 10 ft., it is desirable to choose a pump which will only raise the water to the height that may be required at any particular time, thus avoiding unnecessary operating expense.

The size of the tract and the number of days through the year when the plant will be operated determine in a large measure the class of machinery which it is best to employ. If the pumps are called on for regular work it will usually pay to install automatic high-speed engines, feed water heaters, and other fuel saving devices.

The principles and practice of land drainage, E. R. Jones (*Wisconsin Sta. Bul. 199, pp. 3–30, figs. 15*).—This bulletin discusses the reasons for land drainage, the extent and nature of wet lands in Wisconsin, the leading types of drains and drainage systems, the proper depth, size, and gradient of drains, their cost and durability, some details of tile laying, and some common mistakes in land drainage. Plans for a number of drainage projects are included, with cost data in some cases.

Replies from township assessors, verified by general and detailed field studies, indicated that over 7,000,000 acres in Wisconsin are in need of better drainage. Of this about one-third consists of muck and peat marshes and the remainder is largely made up of wet clays.

Recent irrigation legislation, R. P. Teele (*U. S. Dept. Agr., Office Expt. Stas. Rpt. 1909, pp. 399–414*).—This article summarizes and discusses state legislation affecting irrigation enacted since 1905, previous legislation having been already noted (E. S. R., 18, p. 287). The legislation is discussed under the headings of administrative law, acquirement of rights, distribution of water, transfers, irrigation districts, and general legislation.

[The comparative cost of travel by horse and wagon and automobile] (*Boston Evening Transcript, 1910, Oct. 8, pt. 2, p. 6*).—A report of a 6-day test between a Maxwell automobile and a horse and wagon.

The automobile covered 457.9 miles, at a cost of $6.20 for gasoline and oil, and the depreciation was $8.24, making a total cost per mile of 3.15 cts., and the cost per passenger mile 1.5 cts. The cost of oats and hay for the horse one week was $5.80, the number of miles traveled, 193.3, and the depreciation, $1.47, making the total cost per mile 3.68 cts., and the cost per passenger mile 1.84 cts. There were no repairs in either case. The depreciation in the case of the automobile was rated at 20 per cent a year on the basis of 10,000 miles a year, which amounts to 18 cts. a mile. The depreciation on the wagon, harness, and horse was based on the original cost of $275, the outfit being supposed to last 10 years and to be capable of 10 miles' travel every day, making a depreciation of 0.75 ct. per mile.

Life and care of farm machinery in Colorado, H. M. Bainer and H. B. Bonebright (*Colorado Sta. Bul. 167, pp. 3–19, figs. 8*).—After an investigation of farm conditions the authors estimate the valuation of agricultural implements on Colorado farms at not less than $10,000,000. In connection with the selection of machinery they offer suggestions as to type, size, accessibility to repairs, oils and oiling devices, painting, and care in securing undamaged machinery from the dealer. The relation between proper adjustment and the life of the machine is discussed.

Investigation of 1,716 machines in service indicated that 60.6 per cent needed no repairs. Although but 27.15 per cent were reported on the farms as in need of repair, casual examination showed that 12.25 per cent in addition that were not reported needed repairs, and careful inspection showed that 6.35 per cent needed repairs in addition to those reported on the farm. Implements were reasonably sharp with the exception of smoothing harrows. These were found too dull for good service in 77 per cent of the cases investigated, with 7 per cent too nearly new to be very dull and only 16 per cent in which the teeth had been reversed or sharpened. In dry farming sections, 83 per cent of the harrows, aside from the new ones, were sharp.

Nine per cent of the farms investigated had suitable shops, and on these farms the percentage of machinery not needing repairs was 71.36 as compared with 59.25 per cent on those without shops. The respective percentages of machinery reported by the owners as needing repairs were 22.4 and 27.7, those discovered by the investigator 6.24 and 20.2, and those discovered by the investigator on the machinery reported by the farmer as needing repairs 0 to 7.15, respectively.

All machinery was housed on 22.15 per cent of the farms investigated, part on 39.6, and none except vehicles on 38.25 per cent of the farms. Closed machine sheds were found in 19.46, open sheds in 34.23, and none whatever in 46.31 per cent of all cases investigated. Machinery served as a hen roost in 74 per cent of the open sheds and 31 per cent of the closed sheds, while other farm animals had access to 19.6 and 10.3 per cent, respectively. The machinery was frequently stored without proper cleaning and oiling.

Plans are presented for an implement house and an implement shed.

Iron cow stall.—Hoard-Schulmerich stall, F. L. Kent (*Oregon Sta. Circ. 9, pp. 4, figs. 3*).—A common form of iron cow stall and the Hoard wooden stall, as modified by Schulmerich, are illustrated and briefly described.

Constructing a concrete hen house, A. A. Houghton (*New England Homestead, 61 (1910), No. 15, pp. 316, 326, figs. 8*).—Details are given for constructing a cement poultry house 14 by 40 ft., containing 4 pens, and costing about $195. The advantages of building with this material are discussed.

College dairy barn at the Kansas State Agricultural College, A. Miyawaki (*Hoard's Dairyman, 41 (1910), No. 38, p. 1103, fig. 1*).—A description of the remodeled dairy barn at the Kansas College, in which sanitation was the chief consideration.

Cork brick (*N. Y. Produce Rev. and Amer. Cream., 30 (1910), No. 24, p. 872*).—A brief note on a new floor material for dairy barns. The cork bricks are 9 by 4 by 2 in., and weigh about 2½ lbs. each. They are nonabsorbent and with a smooth, easily cleaned surface.

Water supply for the farm, F. C. Reike (*Farm World, 4 (1910), No. 12, p. 3*).—A brief description is given of a system of supplying water to the farm house and outbuildings and of disposing of the sewage. It is based upon the use of a deep well and windmill and elevated storage tank.

Installing a private water system, W. B. Wallace (*Ann. Rpt. Mo. Bd. Agr., 42 (1909), pp. 290–294*).—The system installed by the author in his home at Bunceton, Mo., is described.

Farm home water supply, C. A. Ocock (*Amer. Thresherman, 13 (1910), No. 4, pp. 22, 23, figs. 3*).—A system using a force pump and a pressure tank is described.

Disposal of house sewage, J. T. Stewart (*Ann. Rpt. Mo. Bd. Agr., 42 (1909), pp. 294–300, figs. 5*.—The septic tank system adapted to farm houses is described and illustrated by the system installed at the Northwest Experiment Farm at Crookston, Minn., which has been described in a bulletin of the Minnesota Station (E. S. R., 20, p. 484).

The country kitchen, C. BARNARD (*Housekeeping Expt. Sta. [Conn.] Bul. 7, pp. 4*).—As a means of diminishing labor and increasing comfort, the author on the basis of trials which he has conducted recommends the use of denatured alcohol and fireless cookers for preparing food, with a separate heater in the cellar for supplying hot water. For the latter purpose a combined laundry stove and water heater of the smallest size was selected and installed in the cellar as nearly under the kitchen boiler as possible and connected with a flue in the chimney, the heater being connected with the device connecting the water-back of the kitchen range with the boiler.

The new house cleaning, C. BARNARD (*Housekeeping Expt. Sta. [Conn.] Bul. 8, pp. 4*).—The advantages of vacuum cleaning are pointed out and suggestions made regarding the use of hand and power cleaners.

The lighting of farm houses, I. T. OSMOND (*Pennsylvania Sta. Bul. 103, pp. 3–19, figs. 8*).—This is substantially a reprint of an article previously noted (E. S. R., 23, p. 592), but also includes a test of an additional kerosene burner which gave very satisfactory results.

The new lamps, C. BARNARD (*Housekeeping Expt. Sta. [Conn.] Bul. 9, pp. 4*).—From experimental studies the author concludes that denatured alcohol lamps are to be recommended.

RURAL ECONOMICS.

The relation of capital to agriculture, M. WHITNEY (*Amer. Rev. of Reviews, 42 (1910), No. 3, pp. 335–337*).—The purpose of this paper is to show that capital will invest in agriculture when the same status prevails as in the case of industrial enterprises, namely, (1) when the material and processes are understood and control is certain, and (2) when labor can be obtained and is under directive control, consequently when the products of labor are certain. To accomplish the best development in agriculture, it is believed there must be an organized cooperation of effort between the various agencies of agriculture, capital, transportation, and State and Federal effort, while to commercialize agriculture and make it a safe line of investment for capital, the soil must be understood and its use determined, and an additional supply of labor must be furnished which at present must be drawn from immigrant farmers.

The conservation of natural resources in the United States, C. R. VAN HISE (*New York, 1910, pp. XIV+413, pls. 16, figs. 20*).—This volume contains the substance of 20 lectures delivered at the University of Wisconsin dealing with the conservation of the minerals, waters, forests, and soils of the United States. It gives the history of the conservation movement and discusses the relations of the subject to the welfare of the whole population. The data are summarized largely from the report of the National Conservation Commission (E. S. R., 21, p. 496).

Agricultural development in the northwest of Canada, 1905 until 1909, J. MAVOR (*Rpt. Brit. Assoc. Adv. Sci., 1909, pp. 209–230, dgm. 1*).—This paper discusses the agricultural conditions in the three prairie provinces of Manitoba, Saskatchewan, and Alberta, with more particular reference to the adaptability of the region to wheat culture for export purposes.

The region comprises some 350,000,000 acres, of which it is estimated that about 17,250,000 acres are annually available for wheat with a possible production of 317,375,000 bushels. Of this yield about 232,250,000 bushels could be exported, which is much less than the quantity of wheat annually imported by Great Britain. The actual yield of wheat in 1909 was 147,500,000 bushels. On this basis "the immense natural resources of the rich soil of Manitoba and of portions of Saskatchewan and Alberta are not even yet being fully exploited. Very considerable improvements in agricultural methods must yet take place if these resources are to be fully utilized." The cost of wheat production was, on new land, 57 cents per bushel; on old land, 36 cents. This makes the margin of profit for the farmer exceedingly small and possibly accounts for the gradual reduction in the acreage of wheat during the period under investigation.

Other information in this article relates to the meteorology of the region, population, immigration, depletion of public lands, the government policy as to the distribution of immigrants, collection of agricultural statistics, agricultural production and progress, irrigation, dry-land farming, land values, and railway development. The number of immigrants from the United States for the years 1901–8 was 333,561.

The development of wheat culture in North America, A. P. BRIGHAM (*Rpt. Brit. Assoc. Adv. Sci., 1909, pp. 230–246*).—This paper discusses the development of wheat culture in the United States and Canada from the earliest settlement of the country to 1908.

Statistical data are presented and discussed on the acreage and yields of wheat; the successive positions of the wheat center and its future location; the development of the industry by the introduction, culture, and breeding of varieties; the effects of wealth production, manufacture, and transportation on wheat culture; the future of the United States and Canada in the world's wheat markets; and the means employed for increasing the output of wheat to meet the demands of increasing population. The place that the United States and Canada take among the world's great wheat-producing countries is regarded as supreme for many generations, because "it is North America which has the land, the progressive appliances, the skilled energy of production, and the facilities of transportation to supply the bread market of coming decades. [But] no citizen of the great Republic need harbour a jealous thought if in that market the major place should come to his northern neighbor."

Small proprietary holdings, F. BERNARD (*Ann. École Nat. Agr. Montpellier, n. ser., 10 (1910), No. 2, pp. 105–129*).—This article reviews the causes which have been in operation in various countries of Europe, in the United States, and in Canada, tending to form an independent class of small agricultural proprietors, and discusses in detail the more recent legislation which has been promulgated for the conservation, encouragement, and protection of the peasant class, particularly in France and other European countries.

While recognizing many defects in recent legislation which the future is expected to correct, it is believed that the policy of the French government in rendering unseizable for debt the property of small holders, who depend upon their holdings wholly or partly for a livelihood, is in the right direction for the maintenance of the peasant class in economic independence, for the social welfare of their families, and for the best interests of their posterity.

Farm management, J. H. HAYNES (*Ind. Farmer, 65 (1910), No. 36, p. 1*).—The economic losses which occur on farms as a result of bad management are outlined in this article. Among the sources of loss mentioned are failure to make the best use of land, to employ intelligent help, to keep laborers constantly employed, to utilize farm waste products to the best advantage, to provide proper storing places for implements and products, to maintain a fruit and vegetable garden for home consumption, and to be in ignorance of the buying and selling prices of farm commodities.

Making good farmers out of poor ones, ROSA P. CHILES (*Amer. Rev. of Reviews, 42 (1910), No. 5, pp. 563–572, figs. 13*).—This is an account of the farmers' cooperative demonstration work of this Department (E. S. R., 19, p. 1027).

The work has increased "from one agent in 1904 to 430 agents at the present time; from one farm it has extended to 60,000 farms and 75,000 farmers; from one State to 13 States," and in addition the boys' corn clubs interest 46,000 boy farmers between 10 and 18 years of age. The economic effects of the movement in increasing the yields and profits of growing cotton, corn, and other crops are described and illustrated.

The mission of cooperative demonstration work in the South, S. A. KNAPP (*U. S. Dept. Agr., Office Sec. Circ. 33, pp. 8*).—This is an extempore address delivered before the agents in immediate supervision of the demonstration fields (see above). The author discusses the need of tile drainage, live stock farming, properly cured hays, farm motors, improved education for country people, and the readjustment of the home. The agents are expected to cooperate with the teachers of the public schools as well as to assist farmers to increase their wealth and obtain greater earning power.

The first aid to shipping fruits, vegetables, butter, eggs, and game for profit to market, T. G. THOMAS (*Houston, Tex., 1910, pp. 98, figs. 2*).—A practical treatise on the marketing of southern produce.

Return of prices of crops, live stock, and other Irish agricultural products, W. G. S. ADAMS (*Dept. Agr. and Tech. Instr. Ireland, Agr. Statis. 1909, pp. XIX+116, dgms. 17*).—Statistics of prices in Ireland of live stock and other agricultural produce for the period ended December 31, 1909, together with tables of average prices for the 20 years 1890–1909 and of the quarterly average prices during 1908 and 1909, are presented and discussed.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 12 (1910), No. 12, pp. 89–96; Sup., pp. 97–104*).—These give statistics on the condition and acreage of crops in the United States and foreign countries, the farm values and range of prices of agricultural products, monthly receipts of eggs and poultry in the chief markets of the United States, a summarized statement of exports of farm and forest products for the years ended June 30, 1909 and 1910, and a portion of the annual report of the Bureau of Statistics of this Department for the fiscal year 1910.

AGRICULTURAL EDUCATION.

Agricultural education, C. W. DABNEY (In *Education in the United States. New York, Cincinnati, Chicago, 1910, pp. 595–651*).—This is one of a series of monographs edited by Nicholas Murray Butler. It gives an account of the earliest discussions of agricultural education, the first agricultural societies and fairs, the rise of agricultural schools, the beginnings of the United States Department of Agriculture, the first agricultural colleges, the land-grant colleges, their classification, requirements for admission, courses of study, military instruction, and expenses of students, statistics, extension work in agriculture, agriculture in the common schools, and the origin of the agricultural experiment stations.

Progress in agricultural education, 1909, D. J. CROSBY (*U. S. Dept. Agr., Office Expt. Stas. Rpt. 1909, pp. 251–325, pls 6*).—This is a review for 1909 of the leading features of progress in agricultural education in this country and abroad, including the educational work of this Department, the Association of American Agricultural Colleges and Experiment Stations, the National Education Association, the Second National Corn Exposition, and the third session of the Graduate School of Agriculture, and of items of interest as to the different agricultural colleges, normal schools, and secondary and elementary schools.

Statistics of land-grant colleges and agricultural experiment stations, 1909, MARIE T. SPETHMANN (*U. S. Dept. Agr., Office Expt. Stas. Rpt. 1909, pp. 211–250*).—A compilation from official sources of general statistics, courses of study, attendance, value of funds and equipment, revenues, and additions to equipment of the land-grant colleges, and of the lines of work, revenues, and additions to equipment of the agricultural experiment stations in the United States for the fiscal year ended June 30, 1909.

Technical milling education, J. ELLIOTT (*Amer. Hay, Flour and Feed Jour., 17 (1910), No. 6, pp. 31–34*).—This paper, read before the Pennsylvania State Millers' Association, discusses the need of technical education for millers and the opportunities for graduates, and outlines the 4-year course in milling introduced last year at the Pennsylvania State College.

The new kind of country schools, JESSIE FIELD (*Farm and Fireside, 34 (1910), No. 2, pp. 3, 4, figs. 3*).—The author describes some of the practical features of school work as conducted in Page County, Iowa, such as the exercises with the Babcock milk tester, supplementary reading and study with Farmers' Bulletins and other agricultural publications, school garden work, making farm devices in manual training, teaching farm problems in connection with arithmetic, and conducting boys' agricultural contests and girls' domestic science contests, with township and county exhibits.

Agricultural extension schools (*Ohio State Univ. Bul. 14 (1910), No. 33, pp. 3–15, figs. 13*).—This circular contains the Ohio law relating to agricultural extension work and a description of the work thus far organized as agricultural extension schools, demonstrations in spraying and pruning fruit trees and mixing commercial fertilizers, field meetings, agricultural trains, fair exhibits, bulletins, suggestions for agricultural work in the rural schools, personal visits to agriculturists, and lectures at institutes, granges, clubs, and other organizations.

Information in considerable detail is given concerning agricultural extension schools, including outlines of courses, rules governing the holding of the schools, suggestions for local organizations, items of local expense, and the daily schedule.

The farmers' institutes in the United States, 1909, J. HAMILTON and J. M. STEDMAN (*U. S. Dept. Agr., Office Expt. Stas. Rpt. 1909, pp. 327–359*).—This is the annual report of the Farmers' Institute Specialist of this Office for 1909 concerning the work of the Office in promoting farmers' institutes and the development of the farmers' institute movement in the different States and Territories. It includes a discussion of agricultural college and experiment station aid to institutes, agricultural college extension work and institutes for women, an account of the annual meeting of the American Association of Farmers' Institute Workers, and statistical tables showing the number of institutes held, attendance, funds appropriated, cost, and number of lecturers employed.

The Home Gardening Association (*Ann. Rpt. Home Gard. Assoc. [Cleveland], 10 (1909), pp. 35, figs. 25*).—This is a report of the work of this association in 1909, including seed distribution, school gardens for normal, backward, defective, and delinquent children, kitchen gardens, a public school botanic garden, flower shows, closing exercises, correlation with other school subjects, a training garden, and vacant lot gardens.

A unit in agriculture, J. D. ELLIFF (*Univ. Mo. Circ. Inform., 1910, July, pp. 65*).—In this circular of information, issued by a committee on accredited schools, and approved by the faculty of the Missouri College of Agriculture, the author gives suggestions concerning the course of study, methods of teaching, and equipment of laboratories and libraries for teaching agriculture in the accredited high schools of the State. The circular is divided into two parts, part 1 dealing with equipment and courses of study, and part 2 with exercises and problems in agriculture.

In part 1 the suggestions for equipment include materials and apparatus for soil studies, plant studies, text-books, and works of reference, and those concerning the course of study include general suggestions to teachers on the use of materials and methods of teaching, with an outline course taking up the subject of agriculture in the following order: Farm crops, the soil, plant propagation, plant growth, enemies of plants, animal husbandry, and problems of farm management. In part 2 there are exercises, problems, and score cards corresponding to this outline course.

The course includes the work usually recommended for two years of high school work but it can probably be covered in one full high school year provided not too much collateral reading is insisted upon.

Forest nurseries for schools, W. M. Moore and E. R. Jackson (*U. S. Dept. Agr., Farmers' Bul. 423, pp. 24, figs. 8*).—The authors have included in this publication specific suggestions and directions for preparing, planning, and caring for small forest nurseries in connection with the public schools. The work outlined includes the collecting, storing, and testing of seeds, preparing the seed bed, treatment of seeds before planting, planting the seeds, care of the seed bed and seedlings, transplanting to the nursery bed, and final disposal of young trees. A nursery planting table for forest trees is also given.

MISCELLANEOUS.

Annual Report of the Office of Experiment Stations, 1909 (*U. S. Dept. Agr., Office Expt. Stas. Rpt. 1909, pp. 439, pls. 19, figs. 6*).—This includes the usual report on the work of this Office for the fiscal year ended June 30, 1909, and of the work and expenditures of the agricultural experiment stations in the United States, including Alaska, Hawaii, Porto Rico, and the Island of Guam; statistics of the land-grant colleges and experiment stations for 1909; and several articles and reviews abstracted elsewhere in this issue.

Twenty-second Annual Report of Massachusetts Station, 1909 (*Massachusetts Sta. Rpt. 1909, pts. 1, pp. 257, pls. 6, figs. 2; 2, pp. 78*).—Part 1 of this report contains the organization list, a report of the director, a financial statement for the fiscal year ended June 30, 1909, reports of heads of departments, and numerous special articles. Part 2, which is the portion designed for general distribution, consists of papers of a popular nature, based on the results of the observations and experiments of the station, and of a brief summary by the director of the more important conclusions from these articles. The experimental work reported in each part of the report is for the most part abstracted elsewhere in this issue.

Monthly Bulletin of the Department Library, October, 1910 (*U. S. Dept. Agr., Library Mo. Bul., 1 (1910), No. 10, pp. 261–294*).—This contains, in addition to the usual data for October, 1910, as to the accessions to the Library of this Department and the additions to the list of periodicals currently received, the rules adopted by the Department Library with reference to interlibrary loans, and references to recent articles of interest to those connected with agricultural libraries.

Experiment Station Work, LX (*U. S. Dept. Agr., Farmers' Bul. 425, pp. 24, figs. 3*).—This number contains articles on the following subjects: Commercial bean growing, digestion experiments with range forage crops, stallion legislation in the United States, substitutes for oats in rations for horses, and simple quantitative tests for casein.

NOTES.

California University.—Excavation has begun for the new agricultural building. This is to be a white granite structure, 162 by 64 feet. The main floor will contain a lecture room to accommodate approximately 500, a museum, the agricultural library, offices, and a laboratory for horticulture and viticulture. On the second floor will be laboratories for entomology and plant pathology, and additional offices and lecture rooms. A laboratory for experimental work in plant pathology, the mailing rooms, a lecture room, and other offices will be housed in the basement.

The third annual series of short courses at Davis has closed with an attendnance of nearly 300, of whom 63 were enrolled in the work in household economics. The regular enrollment of the school at the close of its second year is 77.

Connecticut College and Stations.—The various agricultural organizations of the State, including the college and the stations, have recently formulated a budget giving the amounts to be asked of the State legislature for agricultural purposes for the ensuing biennium. In this budget the college asks for additional appropriations of $75,000 for a dormitory, $25,000 for a poultry school building, $5,000 for extension work, $40,000 for additions to the dairy building and barns, $6,000 for the installation of electric lighting, $5,000 for a students' infirmary, $5,000 for furnishing the new dining hall, and $15,000 for a farm machinery building.

The Storrs Station asks an increase of its appropriation from $4,000 to $9,000, and the State Station for $6,500 additional to replace fire losses. Accompanying the budget is a statement discussing the comparative State expenditures for various purposes during the last 10 years, from which it appears that the appropriations for agriculture aggregated $911,049.86, which is but 2.35 per cent of the total.

Clinton Grant, who for the past three years has been cheese maker at the Storrs Station in connection with its investigations in cooperation with this Department, has accepted a position as assistant in agronomy at the Ohio State University, and entered upon his duties January 1.

To fill the vacancy caused by the death of Prof. William H. Brewer, the Sheffield Scientific School has appointed J. W. Alsop, of Avon, a member of the board of control of the State Station. G. A. Hopson has been elected secretary of the board.

Idaho University.—L. C. Aicher, superintendent of the Caldwell substation, has been appointed assistant in farm mechanics, a new position, and has entered upon his duties. Courses are to be offered in elementary and advanced farm machinery and in farm buildings.

Illinois Station.—Recent appointments of assistants include E. M. McDonald in crop production, E. E. Hoskins, F. C. Grannis, and J. E. Whitchurch in soil fertility, Francis D. Abbott in chemistry, L. W. Summers in animal husbandry, Josephine Kerr in bacteriology, and W. H. Sacks in soils.

Purdue University and Station.—Among the estimates submitted to the legislature by the university are a 50 per cent increase in maintenance for the school of agriculture, $100,000 for a university library, $25,000 for a horse barn, $25,000 for a beef cattle barn, $25,000 for a veterinary laboratory, clinic, and hospital building, $60,000 for a dairy building and equipment, $25,000 for greenhouses, and $15,000 for a horticultural building.

Mary A. Fitch has been appointed scientific assistant in botany in the station.

Kansas College.—A spring school of agriculture, home economics, and related subjects for teachers, continuing from March 28 to June 14 and preceding the summer school from June 15 to July 27, is announced.

Louisiana Stations.—Dr. Harry Morris, a graduate of the veterinary department of the University of Ohio, has been appointed to the position of animal pathologist of the State Station to succeed Dr. Thomas C. Paulsen, recently resigned.

Maine University.—V. R. Gardner has resigned as professor of horticulture and acting dean to become associate horticulturist at the Oregon College and Station. Leon S. Merrill has been designated acting dean.

Michigan College and Station.—William H. Brown, Ph. D. (Johns Hopkins) has been appointed research assistant in plant physiology, with three-fourths of his time to be in connection with Adams fund investigation and the remainder in instruction in advanced plant physiology.

Missouri Station.—E. S. Vanatter has been appointed assistant in soil survey work beginning January 1, and T. R. Douglass assistant in agronomy beginning February 1.

Montana Station.—H. B. Bonebright, professor of farm mechanics at the Colorado College, has been engaged to take charge of the agricultural engineering work, and entered upon his duties February 1.

New Hampshire College and Station.—The new dairy building has now been completed. It is a terra cotta, tile, and cement fireproof structure, with a main portion two stories in height with about 55 ft. frontage and 48 ft. in depth, flanked by two one-story wings 37 by 11½ ft. On the ground floor is a large demonstration room for dairy machinery and a laboratory equipped for dairy chemistry work, with the college creamery in the rear. The second story is occupied by offices, class rooms, and a reading room.

New Mexico College and Station.—R. E. Willard, formerly of the Bureau of Soils of this Department, has been appointed assistant professor of agronomy in charge of soil work. F. W. Christensen, assistant in animal nutrition at the Pennsylvania Institute of Animal Nutrition, has arrived to take charge of chemical work of extensive nutrition digestion experiments in cooperation with the department of animal husbandry. W. A. Lassell has succeeded Louis Iles as dairyman.

Cornell University and Station.—The enrollment in the college of agriculture has now reached 1,254, an increase of more than 34 per cent over last year. The trustees have decided to charge tuition to students in the college of agriculture who are not residents or citizens of the State. It is announced in the daily press that 16 students in the short winter courses were college graduates.

A department of forestry has been established with Walter Mulford, junior professor of forestry of the University of Michigan, as its head. Professor Mulford takes up his regular work at Cornell at the beginning of the next college year, but has been giving about a month to its organization during the present winter.

Walter W. Hall, instructor in cheese making from 1894 to 1908, died at Gouverneur, N. Y., December 15, aged 61 years.

M. M. McCool has been appointed assistant in plant physiology in the college and station.

North Dakota Station.—Leon A. Congdon, whose resignation from the New Jersey State Station has been previously noted, has entered upon his duties as assistant chemist at this station.

Ohio Station.—George R. Green has been appointed assistant forester, and Fred K. Mathis assistant botanist.

Oklahoma College and Station.—Members of the station staff assisted the college on the better seed and live stock train which recently traversed the eastern part of the State. This train was most enthusiastically received, the average daily attendance being over 4,000, of whom fully 60 per cent were farmers. At one stop six rural schools were in attendance.

The department of chemistry has recently completed a special laboratory for nitrogen and other determinations requiring an atmosphere practically free from ammonia.

Oregon College and Station.—C. E. Bradley has resigned as professor of agricultural chemistry and chemist to engage in commercial work in Indiana. Charles A. Cole has resigned as assistant professor of pomology and assistant horticulturist to take up commercial work in Idaho.

Rhode Island College and Station.—The college is asking the general assembly for an appropriation of $75,000 for a new science building. This is expected to house the departments of chemistry, botany, zoology, geology, and bacteriology, including the biological department of the station.

On account of the rapid growth of the Agricultural Experiment Union in Rhode Island and continued applications for admission, it has decided to take out articles of incorporation. The work is expanding so rapidly on account of demands from the farmers themselves that steps may possibly be taken by the organization to secure an appropriation from the State for the continuance of the work on a scale to meet the demands of the people. Its work is carried on in cooperation with the station.

J. E. Seabright has been appointed assistant chemist.

South Dakota College and Station.—Clifford W. Willis has resigned as agronomist to become editor of *Northwest Farmstead*, a new publication.

Tennessee University.—*The Southern Farm Advocate*, of Memphis, Tenn., announces that C. H. Lane has resigned as instructor in agronomy to accept the editorship of that journal.

Texas Station.—William H. Dean, jr., of the Bureau of Entomology of this Department, has been appointed assistant entomologist. H. C. Holmes has been appointed superintendent of the Temple substation, F. L. Young of that at Pecos, and T. W. Buell of that at Denton.

West Virginia University.—The college of agriculture has begun the publication of *School Agriculture*, which is issued monthly from November to April, and is sent free to all teachers and school officers making application. The first number was devoted to soil studies and the second takes up seeds and seedlings.

The first state corn show was held January 5-7, in connection with the short course of the university. A state corn growers' association was organized to further the development of the industry.

Wisconsin University and Station.—A Wisconsin country life conference was held at the university February 14 and 15 under the auspices of the college of agriculture. Special attention was given to social and economic aspects of country life.

M. E. Jahr has been appointed assistant in soils in the college and B. D. Leith assistant in agronomy in the college and station.

Wyoming Station.—A new barn for the agronomy farm has just been completed at a cost of about $3,500. This barn will be primarily a horse barn, with a large room for the storing of station machinery.

It has been proved definitely that the woody aster is a poisonous plant. The losses from it throughout Wyoming have been very great, being estimated at $30,000 for sheep at Medicine Bow alone in 1909.

American Association for the Advancement of Science.—The sixty-second annual meeting of this association and its affiliated societies was held at Minneapolis, December 28–31, 1910, in the buildings of the University of Minnesota. The officers elected for 1911 are as follows: President, C. E. Bessey, University of Nebraska; general secretary, J. Zeleny, University of Minnesota; and general secretary of the council, T. S. Palmer, of the Bureau of Biological Survey of this Department. The next meeting place will be Washington, D. C.

The American Chemical Society had the largest representation of any individual society at the meeting. A notable feature of this session was the first meeting of a section of biological chemistry, under the chairmanship of C. L. Alsberg and I. K. Phelps, of this Department, and with an unusually large number of papers. A. Smith, of the University of Chicago, was elected president for the ensuing year, the secretary and the treasurer being reelected. Its next meeting will be held at Indianapolis, Ind.

Among the other organizations represented, the American Association of Economic Entomologists elected for its president F. L. Washburn of the Minnesota University and Station; vice presidents, E. D. Ball, of the Utah College and Station, and R. H. Pettit, of the Michigan College and Station; and secretary, A. F. Burgess, of the Bureau of Entomology of this Department. The American Association of Horticultural Inspectors formed a permanent organization, with the following officers: President, F. Sherman, jr., of the North Carolina State Station; vice president, T. J. Headlee, of the Kansas College and Station; and secretary-treasurer, T. B. Symons, of the Maryland College and Station. The American Phyto-Pathological Society, at its second annual meeting, elected for president A. D. Selby, of the Ohio Station; vice president, R. A. Harper, University of Wisconsin; and secretary-treasurer, C. L. Shear, of the Bureau of Plant Industry of this Department.

American Home Economics Association.—The third annual meeting of this association was held at St. Louis, December 27–30, 1910, in conjunction with the American Sociological Society, American Economic Association, American Political Science Association, American Association for Labor Legislation, and American Statistical Association. Its program in consequence gave special emphasis to the economic and sociological phases related to home economics, but there was also a long list of scientific papers, particularly in the field of dietetics and nutrition, where 15 papers were offered. There was also a session devoted to courses of instruction in home economics and on extension work as carried on by colleges of agriculture.

Among the officers elected were the following: Honorary president, Mrs. Ellen H. Richards, Massachusetts Institute of Technology; vice presidents, Dr. C. F. Langworthy of this Office, Mrs. Mary Schenk Woolman of Teachers College, Columbia University, and Miss Martha Van Rensselaer of Cornell University, and secretary-treasurer, Dr. Benjamin R. Andrews of Teachers College.

The International Agrogeological Congress of Stockholm.—The widespread revival of interest in the matter of securing uniformity of methods of soil investigation is shown by the organization of the International Agrogeological

Congress, the first meeting of which was held at Budapest in 1909 and the second in connection with the International Geological Congress at Stockholm in 1910.

According to an account in *Nature* the Stockholm meeting was attended by over 160 members. There was an interesting exhibition of soil maps, apparatus, and typical soils.

Among the more important papers presented were the presidential address on Swedish Soil Types and Their Distribution, by Gunnar Andersson (Sweden); The Mechanical Analysis of Soils, by A. Atterberg (Sweden); Mechanical Soil Analysis, by P. Vinassa de Regny (Italy); The Importance of Colloids in Soils, by E. Ramann (Germany); The Colloid Substances in Soils and Their Determination, by D. J. Hissink (Holland); Netherlands Diluvial Loam, by G. H. Leopold (Holland); The Physiological Function of the Plant Foods of the Soil and Their Relative Proportion, by D. Diceniy (Hungary); On the Preparation of Soil Solutions for Chemical Analysis, by A. von Sigmond (Hungary); The Determination of the Assimilable Plant Food in the Soil, by A. Rindell (Finland); The Preparation of Soil Extracts for Chemical Analysis, by A. Vesterberg (Sweden); New Principles of Soil Investigation, by A. Atterberg (Sweden); Agrogeological Investigations in Finland, by B. Frosterus (Finland); The Purpose and Fundamental Principles of Soil Classification, by E. W. Hilgard and R. H. Loughridge (California); The Nomenclature and the Classification of Soil Types, by B. de Inkey (Hungary); The Chemical Analysis of Moor Soils in Their Valuation for Culture Purposes, by H. von Feilitzen (Sweden); Botanical-Geological Investigations of the Swedish Moor Culture Society, by E. Haglund (Sweden); A Climatic Zone Soil Map for Croatia-Slavonia, by K. Gorjanovič-Kramberger (Hungary); Plant Food, Especially Phosphoric Acid and Nitrogen, in Acid Soils and Their Determination, by M. Weibull (Sweden); Some Methods of Analysis in Soil Investigations, by A. Vesterberg (Sweden); Some Notes on the Mechanical Analysis of Soils, Especially of Those of Arid Regions, by W. Beam (Egypt); The Study of Soils in Egypt, by W. F. Hume (Egypt); Nomenclature and Classification of Soils, by P. Kossovich (Russia); Systematic Soil Surveying, by K. O. Björlykke (Norway); and Systematic Soil Surveying, by F. Sandor (Hungary).

Abstracts of several of these papers will be found in this number of the *Record*. The papers emphasized especially the lack of uniformity in methods of examination and classification of soils, stress being laid upon the chemical, physical, and physiological relations rather than on the geological relations of soils. The next meeting of the Congress is to be held in St. Petersburg in 1914.

Agriculture at Southern Educational Association.—At the convention of the Southern Educational Association in Chattanooga, December 27–29, considerable attention was given at both general and special sessions to the different phases of agricultural education. Representing this Department, Assistant Secretary W. M. Hays gave an illustrated address on Vocational Education, Dr. A. C. True read a paper on Correlating the Work in Agricultural Education, Dr. S. A. Knapp gave an address on Our Losses or What We Might Have Had, and D. J. Crosby gave an illustrated talk on Community Work in Rural High Schools.

Dean Russell, of the University of Wisconsin, spoke at one of the evening sessions and showed lantern views to illustrate the Value of Demonstration Methods in the Agricultural Education of the Rural Population. J. F. Duggar read papers on Preparing Teachers to Give Instruction in Agriculture and Courses in Agriculture Adapted to High Schools, and P. H. Rolfs discussed Technical Education, our Greatest Need. There were also several other papers and discussions of this nature in the departments of higher technical education, secondary education, superintendence, and secondary industrial education.

State School of Agriculture in Vermont.—The legislature of Vermont has passed a bill establishing a State school of agriculture with an appropriation of $20,000 for buildings, repairs, and equipment, and $10,000 annually for maintenance. The bill also makes provision for the discontinuance of the State Normal School at Randolph, and the transfer of its property to the trustees of the new school of agriculture. This will give a fairly good equipment of buildings to begin with, and it is understood that suitable land can be procured in the vicinity. The act is to take effect at once and it is expected that the school will open in the fall of 1911. The board of trustees is to consist of the governor and the commissioner of agriculture, ex officio, and three practical agriculturists to be appointed by the governor, and the trustees are to appoint a local director.

Agricultural Instruction at Columbia University.—It is announced that the projected agricultural school of the university will be located at Fishkill-on-the-Hudson, where William Blodgett has given the university a farm of about 750 acres for the purpose, and that active development of the property will begin this spring.

Continuing the work inaugurated last winter the university is conducting a course of 16 lectures on economic agriculture, the lectures being given weekly at 4.30 o'clock by different specialists and by farmers in the vicinity of New York City. The enrollment for these courses, according to the *Country Gentleman*, was 170, as against 35 last year.

Experiment Station at Oaxaca, Mexico.—According to a recent note by Consular Agent E. M. Lawton, of Oaxaca, Mexico, the formal opening of this station (E. S. R., 22, p. 498) occurred in connection with the recent centennial celebration of Mexican independence. The equipment includes 2,000 acres of diversified soils and altitudes, an electric pumping plant, an irrigation system, and extensive buildings. Stock raising, dairying, forestry, and plant propagation are among the lines of work contemplated. It is also planned to open a school for the practical instruction of prospective overseers and foremen of haciendas and ranches early in 1911.

New Jersey Country Life Meeting.—A rural life conference was held at Morristown, N. J., November 19. The speakers included President Henry A. Buttz, of Drew Seminary, who presided; President K. L. Butterfield, of the Massachusetts Agricultural College, who spoke on the rural church in country life; Assistant Secretary W. M. Hays, of this Department, who discussed the rural school systems and agricultural high schools; Miss Sarah B. Askew, of the New Jersey State Library, who spoke of the benefits of traveling libraries to country people; Mrs. Frank Ambler Pattison, president of the New Jersey State Federation of Women's Clubs, as to the possibilities of such clubs in rural districts; and Preston G. Orwig, organizing secretary of the Boy Scouts of America, and Dr. George E. Fisher, of the International Committee of the Y. M. C. A., regarding certain phases of their work for country boys. During the conference a commission was appointed to study rural conditions in Morris and Essex counties, with a view to putting into practical working the suggestions presented.

Montana Country Life Commission.—A country life commission of five has been organized in Montana, among the members being F. S. Cooley, of the Montana College. Among its suggested projects is the organization of farmers' clubs.

EXPERIMENT STATION RECORD.

CONTENTS OF VOL. XXIV, NO. 4.

SUBJECT LIST OF ABSTRACTS.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

HORTICULTURE.

FORESTRY.

DISEASES OF PLANTS.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

DAIRY FARMING—DAIRYING.

VETERINARY MEDICINE.

RURAL ECONOMICS.

AGRICULTURAL EDUCATION.

MISCELLANEOUS.

LIST OF EXPERIMENT STATION AND DEPARTMENT PUBLICATIONS REVIEWED.

NOTE.—The price of *Experiment Station Record* is $1 per volume, and two volumes are issued annually. It may be purchased from the Superintendent of Documents, Washington, D. C., to whom all remittances should be made. The publications of the state experiment stations are distributed from the stations and not from the Department.

EXPERIMENT STATION RECORD.

VOL. XXIV. ABSTRACT NUMBER. NO. 4.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Studies of the changes occurring in heated soils, S. U. PICKERING (*Jour. Agr. Sci., 3 (1910), No. 3, pp. 258–276, charts 5*).—" The water extracts obtainable from soils are of constant composition as regards organic matter when the time allowed for the extraction varies from 20 to 320 minutes, the temperature from 7 to 23°, and the proportions from 5 to 10 of soil to 100 of water. The inorganic matter is not affected by the time, but is by the temperature and proportions.

" The increase in soluble matter produced by heating a soil, and the accompanying toxic qualities toward the germination of seeds in it, is gradually reduced by exposing these soils in a moist condition to the air, even under aseptic conditions, but is not reduced when the soils are kept moist in the absence of air. The destruction of the toxic substance is probably, therefore, due to oxidation.

" Unheated soils, or soils heated only to a low temperature, exhibit on keeping an increase in soluble matter; this occurs whether air is admitted or not, and this change, therefore, is probably not an oxidation process; the substance formed, moreover, in such cases appears to have little or no toxic action on germination. This increase of soluble matter, due to the formation of a nontoxic substance, is preceded by a preliminary diminution of soluble matter, precisely similar to the diminution of toxic matter occurring continuously in the more highly heated soils; such toxic matter, therefore, appears to be present in all soils, whether heated or not, though, in the latter case, it is present in such small quantities that it soon becomes completely oxidized.

" Air-dried soils, heated and unheated, when kept for some months show an appreciable reduction in soluble constituents, and also in toxic properties (where such properties were originally present), closely similar to the reduction exhibited by moist soils kept in air for about 10 days."

Chemical nature of soil organic matter, O. SCHREINER and E. C. SHOREY (*U. S. Dept. Agr., Bur. Soils Bul. 74, pp. 48, pl. 1*).—The authors herein report the results of investigations of numerous soils, from which they have isolated 16 definite organic compounds which " belong to 8 different classes of chemical compounds, some containing carbon and hydrogen only, some containing carbon, hydrogen, and oxygen, and some containing carbon, hydrogen, oxygen, and nitrogen. Paraffin hydrocarbons, acids, alcohols, esters, carbohydrates, hexone bases, pyrimidin derivatives, and purin bases are represented. The list of isolated and identified compounds comprises: Hentriacontane, $C_{31}H_{64}$; monohydroxystearic acid, $C_{18}H_{36}O_3$; paraffinic acid, $C_{24}H_{48}O_2$; lignoceric acid, $C_{24}H_{48}O_2$; phytosterol, $C_{26}H_{44}O.H_2O$; pentosan, $C_5H_8O_4$; histidin, $C_6H_9O_2N_3$; arginin, $C_6H_{14}O_2N_4$; cytosin, $C_4H_5ON_3.H_2O$; xanthin, $C_5H_4O_2N_4$; hypoxanthin, $C_5H_4ON_4$; fatty glycerids and several resin acids and esters.

"The conclusion is reached that while the work here reported shows the complex character of the organic matter of soils, this complexity is not so great that the chemical nature of all of the organic matter of soils can not be determined by modern methods of research."

A schematic representation of the methods utilized for separating and isolating the above bodies is given. See also a previous note (E. S. R., 20, p. 919).

Studies of the ammonia-soluble organic matter of the soil, G. S. FRAPS and N. C. HAMNER (*Texas Sta. Bul. 129, pp. 7–49*).—The first section of this work deals with a comparative study of methods for estimating the humus in soils. The authors use the term "humus" in this paper for convenience in designating the ammonia-soluble organic matter, but do not mean to subscribe thereby to any theory which concerns the importance of the ammonia-soluble material.

A comparison between the official method (E. S. R., 19, p. 506) and the Snyder method (E. S. R., 5, p. 857; 7, pp. 477, 484; 9, pp. 632, 641; 16, p. 956) showed that the latter gave lower results on igniting the extract but that the solution contained more clay (ash). Correcting by the Peters-Averitt method (E. S. R., 18, p. 114) by subtracting 10 per cent of clay showed the Snyder method to give the lower results of the two, from which the authors conclude that "a correction of the loss on ignition by subtracting 10 per cent of the ash, as proposed by Peters and Averitt, is better than no correction."

The authors consider that the selecting of a method for this work is greatly dependent upon its ease of execution. The official method has the advantage of bringing less clay into suspension and apparently extracts just as much organic matter (or more) as the Snyder method. On the other hand, when utilizing this method for heavy clay soils gumming occurs and a long time is required for the extraction process. "Filtration through unglazed porcelain removes the clay, but a portion of the organic matter may not pass through. The clay may be precipitated by means of various salts, such as ammonium sulphate or chlorid and sodium sulphate or chlorid." A further study is to be made of the electrolytic method for removing the clay. It was also noted that "evaporation and solution of the residue in ammonia as proposed by Mooers (E. S. R., 19, p. 714) appears to be the most promising method for the estimation of humus. Precipitation with acid, as is to be expected, removes only a portion of the dissolved organic matter. The average recovery is 64 per cent. Extended washing with acid increases the quantity of ash in suspension but has little effect on the organic matter. Strong ammonia extracts more organic matter than dilute ammonia. This is evidence that material goes into solution which is not 'ammonium humate' but is merely organic matter soluble in ammonia, or converted by it into soluble compounds."

Part 2 treats of the formation of ammonia-soluble organic matter in the soil, and shows that "organic matter added to the soil already contains ammonia-soluble material. When no correction is made for the ammonia-soluble substances in the added material, ammonia-soluble humus is apparently formed in the decay of cotton-seed meal, etc., but when correction is made for the added ammonia-soluble material the ammonia-soluble material is found to decrease. The least loss of organic matter takes place with a soil containing water equal to 77 per cent of its saturation capacity."

Section 3 deals chiefly with the composition and properties of the precipitated humic acids as prepared from various soils.

The conclusions from this work are as follows: "'Humic acid' was prepared by two methods, with ammonia and with sodium hydroxid and sodium phosphate. Humic acid shaken with salt solution according to Hopkins' method for soil acidity (E. S. R., 14, p. 1045) exhibits only about 12 per cent of its real acidity." The authors also point out that the humates do not behave toward precipitating agents as in ordinary reactions but almost always require an excess of the reagent before the precipitation occurs, and further that a difference exists in the humates obtained from various soils.

"Magnesium salts do not precipitate some humates, and magnesium humate is much more easily soluble in water than calcium humate. Humic acid is dissolved by caustic soda in presence of calcium carbonate. Analyses of humic salts gave an equivalent [combining weight] of about 250 for the mixed humic acids. Humic acid boiled with hydrochloric acid gave about 2 per cent reducing sugars. The humus preparations contain easily diffusible material, when dissolved in ammonia. After 2 or 3 diffusions, the 'ammonium humate' diffuses at the nearly constant rate of about 1 to 2 per cent of the humate. The quantity of phosphoric acid in the humus preparations by ammonia varies from 0.13 to 0.54 per cent, which is a small amount. The purified humic acid (by ammonia) contains 44 to 56 per cent carbon and 4.3 to 5.4 per cent nitrogen. Humic acid extracted by phosphate contains a high amount of ash. The water and ash-free material contains 52 to 64 per cent carbon and 3.7 to 5.2 per cent nitrogen. The humic acids from the California soils are not rich in nitrogen. Humus soluble in alcohol contains higher percentages of carbon than that not soluble. The clay precipitated by ammonium salts from the humus solution contains from 1.53 to 7.80 per cent carbon, equivalent to 2.64 to 13.45 per cent organic matter. The suspended clay may thus contain considerable percentages of organic carbon. The loss on ignition, less the organic matter, varies from 1.77 to 13.04 per cent of the clay. The average is 8 per cent. This is the amount of the correction which should be made, if any is to be made."

The ammonia in soils, E. J. RUSSELL (*Jour. Agr. Sci., 3 (1910), No. 3, pp. 233–245, figs. 2*).—The author for the purpose of this work considers a substance an ammonia compound if it evolves ammonia quickly, completely, and in one stage, when treated with alkalis at a low temperature.

"When soils are distilled at low pressures with small quantities of potash dissolved in alcohol, a definite amount of ammonia is evolved and the reaction then comes to an end. It is considered that this amount represents the ammonium salts in the soil. When larger quantities of potash are used, or when baryta or magnesia in aqueous suspension is substituted, the decomposition is not definite but continues indefinitely. During the progress of the first distillation, however, magnesia gives off the same quantities of ammonia as small quantities of alcoholic potash.

"Two methods based on these observations are given for estimating the amount of ammonia in soils. If the amount of organic matter is not too high distillation with magnesia at reduced pressure gives accurate results, otherwise it is necessary to use alcoholic potash. The quantity of ammonia in samples of soil taken at different periods of the year is found to be constant but very small, being only about one or two parts per million of soil. The higher the amount of organic matter the greater the ammonia content, rising to five or six parts per million on heavily dunged arable or garden soils.

"As there is no tendency for ammonia to accumulate it follows that the rate of nitrification must be greater than that of ammonia production and in normal conditions is limited by this rate. Reviewing in the light of this observation the various methods of studying the rate of nitrification in soil, it is seen that they really deal with three separate things—the rate of ammonia production in soil, the rate of nitrification in soil, and the rate of nitrification in a culture solution. In these circumstances it is not surprising that concordant results have not been obtained. When ammonium salts react with soil a certain proportion enters into a stable combination which is not decomposed on distillation with alcoholic potash or magnesia and is therefore not an ammonium compound. Its constitution has, however, not been determined."

Vegetable proteins, T. B. OSBORNE, trans. by HELENE SCHLESINGER (*Ergeb. Physiol., 10 (1910), pp. 47–215, figs. 7*).—In this publication the author presents the work done in the field of the chemistry of the vegetable proteins, and which includes much of his own work (E. S. R., 22, p. 509; 23, p. 410). The subject is treated from the standpoint of the proteins, and their ultimate cleavage products as they occur in the individual seeds or plants.

The partial hydrolysis of proteins.—II, On fibrin-heteroalbumose, P. A. LEVENE, D. D. VAN SLYKE, and F. J. BIRCHARD (*Jour. Biol. Chem., 8 (1910), No. 4, pp. 269–284*).—The authors report work on the preparation and hydrolysis of hetero-albumose. Out of a total of 58.05 parts of amino acid obtained from 100 parts of albumose, glutaminic acid constituted 9.51, prolin 4.27, aspartic acid 4.73, arginin 6.35, lysin 4.80, and cystin 4.10 parts.

On the refractive indexes of solutions of certain proteins.—II, The paranucleins, T. B. ROBERTSON (*Jour. Biol. Chem., 8 (1910), No. 4, pp. 287–295*).—"The refractive indexes of solutions of paranuclein, prepared from casein in the manner described in the body of the paper, are connected with their concentrations by the formula $n-n_1=a\times c$, where n is the refractive index of the solution, n_1 is the refractive index of the solvent, in this instance fiftieth-normal potassium hydroxid (1.3334 at 22°), c is the percentage concentration of the protein in the solution, and a is a constant which is numerically equal to the change in the refractive index of the solvent which is brought about by dissolving 1 gm. in 100 cc. The same law has previously been shown to hold good for solutions of casein and of ovomucoid in various solvents.

"The value of a, in the above formula, for paranuclein is 0.00140. 'Paranuclein A' is prepared from paranuclein by partial digestion with calcium hydrate and differs from it mainly in its lower phosphorus content. It is impossible to distinguish between paranuclein and Paranuclein A by the change which their presence causes in the refractive index of an alkaline solution, since for this substance the value of a is also 0.00140.

"[The author has] previously shown that a substance is synthesized through the action of pepsin at 36° upon the concentrated products of the complete peptic hydrolysis of casein which closely resembles Paranuclein A in its properties. It is shown in this paper that it also resembles Paranuclein A in its effect upon the refractive index of an alkaline solution, the value of a for this substance being also 0.00140.

"[The author has] previously shown that a substance is synthesized through the action of pepsin at 60° upon the unconcentrated products of the complete peptic hydrolysis of casein, which is apparently identical with the above-mentioned substance and with Paranuclein A. In this paper it is shown that for this substance also the value of a is 0.00140.

"These data may be regarded as affording confirmation of the view that the above-mentioned substances, synthesized through the action of pepsin from the products of the complete peptic hydrolysis of casein, are members of the paranuclein group."

On the differentiation of proteins of closely related species by the precipitin reaction, D. A. WELSH and H. G. CHAPMAN (*Jour. Hyg. [Cambridge], 10 (1910), No. 2, pp. 177–184*).—"It is possible clearly to distinguish heterologous proteins of closely related species from the homologous protein by precipitin interactions arranged with regard to the fact that in the conditions of the experiment the weight of precipitate is proportional to the weight of antiserum employed. By 'saturation experiments' it is possible to indicate in an avian egg-white antiserum the presence of a general avian antisubstance (precipitin) together with the specific antisubstance."

The consistency of these results, with the interpretation of the precipitin reaction, lends further support to the working hypothesis which the authors have advanced in previous papers.[a]

The absorption of acids by carbohydrates, F. Robinson (*Proc. Cambridge Phil. Soc., 15 (1910), No. 6, pp. 548–558*).—"Carbohydrates adsorb hydrogen chlorid and hydrogen bromid with great readiness at the ordinary temperature, but the quantity of acid adsorbed varies greatly with the carbohydrate considered. The relative order of adsorption seems to show no relationship to the chemical constitution and properties of the various carbohydrates and hence no method has been obtained for characterizing them. There appears to be no definite connection between the adsorbing power for these acids and the production of bromo or chloromethylfurfuraldehyde, since starch gives an extremely minute yield of bromomethlyfurfuraldehyde, yet it adsorbs most acid. The hexaldoses always appear at the bottom of the table. Maltose and lactose differ widely in their powers of absorption, although they bear a great resemblance in their chemical properties. The initial phenomenon agrees with that generally accepted for adsorption, and some constant values have been determined by experiment.

"The process probably consists of a rapid condensation of the acid on the surface of the solid and afterwards it works its way into the interior: this is evidenced by fructose and sucrose and hydrogen bromid, in which case the sugar first becomes pink and eventually black; this black color may be either due to chemical action or to the formation of an 'adsorption compound' as in the case of the so-called 'iodid of starch.'"

Micro-photographic records of artificial sucrose-raffinose crystals, H. E. Zitkowski (*Amer. Sugar Indus. and Beet Sugar Gaz., 12 (1910), No. 10, pp. 364–366, figs. 10*).—Tests and micro-photographs were made with mixtures of sucrose and raffinose for the purpose of determining the effect of temperature and varying proportions of those substances on the shape and the rate of crystallization. The raffinose was prepared from cotton-seed meal.

Viscosaccharase, an enzym which produces slime from cane sugar, M. W. Beijerinck (*K. Akad. Wetensch. Amsterdam, Proc. Sect. Sci., 12 (1910), pt. 2, pp. 635–649, pl. 1; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 572, I, p. 450*).—*Bacillus mesentericus vulgatus*, *B. megatherium*, and like organisms, when grown on a medium containing agar (2 per cent), saccharose (2 per cent), potassium nitrate (0.02 per cent), dipotassium hydrogen phosphate (0.02 per cent), and tap-water produce an emulsion which is due to the presence of viscosaccharase and which produces a colloidal substance and a reducing sugar. Viscosaccharase apparently is also a synthesizing enzym, and a relation evidently exists between the colloidal substance produced and dextran.

The normal weight of dextrose, C. A. Browne (*Abs. in Science, n. ser., 32 (1910), No. 823, p. 475*).—The pure dextrose value (dissolved to 100 true cc. at

[a] Austral. Med. Gaz., 25 (1906), No. 1, pp. 7–13. Proc. Roy. Soc. [London], Ser. B, 78 (1906), No. B 525, pp. 297–313; 79 (1907), No. B 534, pp. 465–473; 80 (1908), No. B 538, pp. 161–164; 82 (1910), No. B 557, pp. 398–406. Trans. 8. Austral. Med. Cong., 2 (1908), pp. 269–273. Jour. Path. and Bact., 13 (1909), No. 1, pp. 206–231.

20° C.) was found by the author to be 32.25 gm. when calculated according to Tollen's formula. Other authorities have found this to be from 32.5 to 33 gm., according to the concentration of the dextrose in solution.

In using this normal weight the actual dextrose scale divisions are found by means of a table or a formula which is accurate for variations in specific rotation due to concentration. The advantage in employing the method lies in the fact that the percentage of dextrose is found in one operation without making a preliminary analysis in order to find out how much material is to be weighed out.

Time factors in the determination of nitrogen and other observations on the Kjeldahl method, P. L. HIBBARD (*Abs. in Science, n. ser., 32 (1910), No. 823, p. 476*).—"Organic substances such as blood or bone have their nitrogen completely converted into ammonia by boiling 3 hours with 25 cc. of sulphuric acid, 10 gm. potassium sulphate, and ½ gm. copper sulphate; in most cases. In distillation of this digestion practically all the ammonia is obtained in less than 15 minutes. Bumping of the digestion is prevented by addition of 1 to 2 gm. ferrous sulphate. Using the Ulsch-Street method, only a few minutes are required to change the nitrogen of nitrates to ammonia. During the acid digestion loss of ammonia occurs when a large portion of the acid has been driven out by too much or too long-continued heat, but not because the flask is heated by the bare flame above the level of the acid."

Note on the Kjeldahl estimation of nitrogen in fatty substances, J. A. BROWN (*Chem. News, 102 (1910), No. 2644, p. 51*).—"On distilling off the ammonia into standard acid in the Kjeldahl estimation of nitrogen in such substances as cheese, milk, etc., the author has frequently found that a troublesome frothing ensues in the alkaline liquor, which compels the operation to be conducted very slowly, and with constant attention, to prevent the alkaline liquor frothing over into the distillate and vitiating the result. . . .

"The author has found that the frothing is caused by traces of fatty acids, which escape decomposition in the digestion with strong H_2SO_4 by volatilizing and condensing firmly, in minute disks, on the long neck of the Kjeldahl flask, where they are with great difficulty, if at all, rinsed back into the tub. These fatty acids appear to be identical with those which constitute the insoluble volatile fatty acids in the Reichert distillation of butters, i. e., the Polenske value. The undecomposed fatty acids combine with the excess of alkali, added for the subsequent distillation of ammonia, to form a soap, which causes the liquid to froth when boiled. This may be prevented by diluting the digested substance, previous to adding excess of alkali, to about 100 cc. with distilled water and boiling briskly until only about 40 cc. remains in the flask. On now making alkaline and proceeding in the usual way, the distillation can be conducted with the greatest rapidity, without even attending to the initial ebullition."

The formaldehyde method for the estimation of nitrogen in organic substances, A. M. WRIGHT (*Trans. and Proc. New Zeal. Inst., 42 (1909), pp. 224, 225*).—The author shows that Bennett's method [a] can be advantageously employed for organic substances such as meat extracts, mixed commercial fertilizers, dried tankage, and dried blood. It is carried out as follows:

"The substance under examination is digested with sulphuric acid and sulphate of potash until the liquor is clear; the excess of acid is neutralized with sodium hydrate solution, using phenolphthalein as the indicator; a neutral solution of formaldehyde is added, liberating the sulphuric acid present in combination with ammonia; hexamethylenetetramine is formed, which is neutral to

[a] Jour. Soc. Chem. Indus., 28 (1909), p. 291.

phenolphthalein; the liberated acid is titrated with decinormal alkali solution until the pink color returns."

The results of comparative tests between this and the Kjeldahl method are given.

Volumetric determination of potassium by the cobalti-nitrite method, O. M. SHEDD (*Jour. Indus. and Engin. Chem., 2 (1910), No. 9, pp. 379–384*).—After studying the various factors which influence the ultimate results of this method, the author states that the Drushel modification of the cobalti-nitrite method (E. S. R., 20, p. 307) is very accurate if "properly handled, but an inexperienced worker not knowing its weak points may not have this opinion with his first use of it." Briefly stated, the outline of the method which has given the best and most uniform results in this work is as follows:

"The solution containing the potassium salt, after the preliminary work has been done to get it at this stage, is evaporated in a 500 cc. casserole to a small volume of about 5 cc., slightly acidified with acetic acid and 15 cc. fresh nitrite reagent added. The larger amount of nitrite reagent makes possible a better filtration and a good excess of reagent after the evaporation is made. The solution is evaporated on the water bath for about 45 to 60 minutes, or until the contents become a thick sirup while hot and pasty on cooling. Continued heating is to be avoided, and this is important to obtain good results. After the filtration is made and the casserole washed, the Gooch crucible and contents can be put in the same casserole and treated with permanganate, as prescribed in the method."

See also previous notes (E. S. R., 22, p. 510; 23, p. 509).

Quantitative chemical analysis of animal tissue.—V, Estimation of chlorin, W. KOCH (*Abs. in Science, n. ser., 32 (1910), No. 823, p. 477*).—The estimation of chlorin and aqueous extracts of lipoid-like substances or in the ash is sometimes difficult and often yields inaccurate results. This is particularly so with the ash, because the chlorids are often displaced by the sulphates or phosphates during the burning of the organic combinations.

"In connection with the methods previously outlined (E. S. R., 22, p. 411) it was found that the chlorids all pass into the fraction 2 or the alcohol soluble fraction. By precipitating the lipoids in this fraction without chloroform and with nitric instead of hydrochloric acid a solution is obtained in which the chlorids can be titrated direct by Volhard's method. The estimation of chlorin can be thus combined with that of any other tissue constituent described in these methods. Some results obtained on the brain are given."

The estimation of iodin in organic compounds and its separation from other halogens, A. F. SEEKER and W. E. MATHEWSON (*U. S. Dept. Agr., Bur. Chem. Circ. 65, pp. 5*).—As accurate results could not be obtained with the Carius method for estimating the iodin in erythrosin, the authors elaborated a satisfactory method which is based on treating the erythrosin with potassium permanganate and nitric acid. This decomposes the organic matter, volatilizes the chlorin and bromin, and leaves the iodin as iodic acid.

Quantitative determination of ergot in flour, R. BERNHART (*Ztschr. Ricch u. Geschmackst., 2 (1910), No. 11, pp. 122, 123; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 12, p. 778; Analyst, 35 (1910), No. 413, p. 357*).—"The amount of ergot in flour can be determined as follows: Two hundred gm. of flour are boiled with dilute hydrochloric acid (not less than 2 per cent) till all the starch is converted into sugar. The solid matter is filtered off through silk, and washed. The filter while still moist is dipped, first into dilute, then into 98 per cent alcohol. The residue is extracted with acetone and carbon tetrachlorid to remove the fat. It is then shaken with strong, freshly prepared ammoniacal copper oxid for half an hour, diluted with 10 times its volume of water, and the insoluble matter filtered off through silk and washed with dilute hydrochloric acid. The substance so obtained is boiled for an hour with 3 per cent potassium hydroxid solution, and dissolved in concentrated hydrochloric acid. After 12 hours the liquid is rapidly filtered through asbestos, and poured into 50 times its volume of ice-cold water. The precipitate is collected, washed, dried, and weighed. The substance so obtained is chitin, which is present to the extent of 2.305 per cent in ergot."

Characteristics and external examination of honey, L. VAN GIERSBERGEN (*Ztschr. Öffentl. Chem., 16 (1910), No. 19, pp. 369–375; Pharm. Weekbl., 47 (1910), No. 27, pp. 730–739*).—After discussing the various processes for obtaining honey, the author discusses the characteristics of honeys from various sources and the judging of their quality on this basis.

Chemical examination of honey, G. L. VOERMANN (*Ztschr. Öffentl. Chem., 16 (1910), No. 20, pp. 401–408; Pharm. Weekbl., 47 (1910), No. 27, pp. 739–748*).—A general discussion of the subject.

In regard to the examination and judging of marmalades, A. BEYTHIEN and P. SIMMICH (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 5, pp. 241–272*).—The authors conclude that the figure given for the specific rotation of German starch sirups according to Juckenack,[a] +134.1, should stand, particularly as this is rather high and there is no danger of doing an injustice when judging these products.

The ratio of glucose to fructose in fruits does not fluctuate to any great extent, and therefore the specific rotation of the total sugars does not always express that of the invert sugar. These deviations, however, have no great influence on the specific rotation of the inverted marmalade extracts, with the exception of that of the apple, the left-handed rotation of which is favorable for the manufacturer. In calculating the specific rotation according to Juckenack, the extract content of the inverted solution must always serve as a basis.

The authors recommend that the nonsugars be determined by difference, subtracting the total sugars as invert sugar from the extract in the inverted solution. It was further found that when various amounts of sugar were added the results for insoluble matter were very variable and not relative, so that care must be exercised in declaring that a marmalade contains added dregs. The authors give a scheme of analysis based on the findings of many analysts with fruits.

Observations in regard to the proportion of sugar contained in grapes during ripening, A. BOUFFARD (*Ann. Falsif., 3 (1910), No. 23, pp. 394, 395*).—This is a polemical article (E. S. R., 23, p. 414).

[Observations in regard to the proportion of sugar contained in grapes during ripening], L. ROOS and E. HUGUES (*Ann. Falsif., 3 (1910), No. 23, p. 395*).—A reply to the above.

Comparative tests in regard to the diminution of acidity in nonsugared and sugared wines of the year 1908 in the Palatinate, HALENKE and KRUG (*Arb. K. Gsndhtsamt., 35 (1910), pp. 404–429*).—In all wines a decided diminution of acidity took place, this being greatest in the unchanged and dry sugared wines. With a decrease in total acidity and extract there was a parallel increase in lactic acid.

Comparative tests in regard to the diminution of acidity in nonsugared and sugared wines of the year 1908 in Franconia, OMEIS (*Arb. K. Gsndhtsamt., 35 (1910), pp. 393–403*).—Observations in regard to the loss of acidity in nonsugared and sugared Franconian wines during storage showed that in no

[a] Ztschr. Untersuch. Nahr. u. Genussmtl., 8 (1904), No. 9, p. 548.

instance did a decided diminution of the acidity take place. Such diminution as did occur is due in part to a precipitation of the tartaric acid and partly to the action of the succinic acid decomposing bacteria. The influence of the climatic condition on the above results is also considered.

Estimation of free and combined sulphurous acid in wines, P. CAZENAVE (*Ann. Falsif., 3 (1910), No. 18, pp. 154–158, fig. 1; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 572, II, p. 544*).—The author observed by actual test that the iodometric estimation of sulphurous acid is untrustworthy, and recommends determining it by oxidation and gravimetric analysis.

It was concluded that the total sulphurous acid is best estimated from the quantity of sulphate present before and after oxidation with iodin. The free sulphurous acid can be removed by distilling the wine for 5 minutes under reduced pressure at 50° C. The fixed or residual sulphurous acid is determined after the distillation, and the free sulphurous acid estimated by difference. It was found that it was not necessary to distill the free sulphurous acid in an atmosphere of carbon dioxid.

Some rare oil fruits, C. GRIMME (*Chem. Rev. Fett u. Harz Indus., 17 (1910), Nos. 7, pp. 156–158; 8, pp. 178–183; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 16, pp. 1019, 1020; Chem. Zentbl., 1910, II, No. 8, pp. 580–582*).—Chemical and physical data are reported in regard to the fat, oil, etc., obtained from the following fruits: *Acrocomia tolai*, *Ximenia americana*, *Moquilia tomentosa*, *Pentaclethra macrophylla*, oil fruit from Guatemala, *Canarium oleosum*, *Carapa procera*, oil fruit from Mexico, *Sterculia appendiculata*, *Mesua ferrea*, *Terminalia catappa*, *Acanthosicyus horrida*, and *Citrullus naudinianus*.

Detection of lemon oil in orange oil, E. M. CHACE and A. R. ALBRIGHT (*Abs. in Science, n. ser., 32 (1910), No. 823, p. 475*).—The authors rely on the refractive indexes of the aldehydes contained in lemon and orange oil as a basis. These aldehydes are separated by the formation of double sulphite compounds, which are eventually decomposed with sodium carbonate and caustic soda under ether. The ether is then evaporated and the refractive index is taken of the residue after drying and purification. Citral has practically the same index as the aldehydes from pure lemon oil. The method is only approximately quantitative.

Quantitative determination of benzoic acid in foods, F. H. VAN DER LAAN and H. TIJDENS (*Chem. Weekbl., 7 (1910), No. 27, pp. 603–615; abs. in Chem. Zentbl., 1910, II, No. 7, p. 496*).—It is stated that this is best done by adding alkali to the sample, extracting with warm water, acidifying, and extracting with Van Ledden Hulsebosch's perforation apparatus for 5 hours with an acid solution of benzol. After the extraction process the benzol is washed with a little water to remove the foreign acids which may be present and then titrated with a decinormal sodium hydrate solution and phenolphthalein. If salicylic acid is simultaneously present with the benzoic acid the salicylic acid may be destroyed by oxidizing with potassium permanganate in a weak alkaline solution.

The analysis of Emmental cheese, G. KOESTLER (*Milchw. Zentbl., 6 (1910), No. 7, pp. 289–299*).—In determining the dry substance in Emmental fat cheese no difficulty was experienced in obtaining good constant weights when from 5 to 8 gm. of finely ground cheese were weighed out quickly (with the weighing bottle and by difference) into flat porcelain dishes, placed in a vacuum desiccator for a day, and finally dried in a hot-water oven from 2 to 2½ hours until comparative estimations yield no more than a difference of 2 mg.

The fat in Emmental cheese which is manufactured uniformly is very evenly distributed throughout the cheese mass. When sampling cheeses which are not overripened the results show that it is best to take the sample in the middle of a line which runs from the center to the edge of the cheese. From the results of numerous analyses and observations it was noticed that 45 per cent of fat (calculated to dry substance) is the limit of fat which can be obtained, considering technical losses, in full-fat Emmental cheese.

The quantitative determination of rice spelts in feeds and fertilizers, T. Katayama (*Landw. Vers. Stat., 73 (1910), No. 1–3, pp. 171–185*).—The author made numerous analyses of rice spelts for ash, silicic acid, crude fiber (by the Henneberg-Stohmann method,[a] and crude fiber, pentosans, and incrusting substances (lignin and kutin) by the König method[b] (E. S. R., 10, p. 411; 18, pp. 524, 664), with a view to testing the validity of Schröder's method (E. S. R., 20, p. 611; 21, p. 211), which is based on the assumption that rice spelts contain the silicic acid in different proportions from other feeding stuffs. The results show that the silicic acid content of the spelts is greatly dependent upon the climate, the variety, and the soil, while the crude fiber, lignin, and kutin vary very little in this respect.

Comparative tests were further made between average samples of rice feed meal and wheat bran, from which it is noted that the silicic acid of the wheat bran is mostly soluble in hydrochloric acid, while that from the rice feed meal is difficultly so. The silicic acid content of the former fluctuated only slightly and is less in amount than that in the latter, which also fluctuated very markedly. The crude fiber content of the wheat bran varied considerably and had a direct relation to the different characters of the bran, average bran containing from 8 to 12 per cent.

The results further indicate that Schröder's method leaves much to be desired when compared with both the Henneberg-Stohmann and the König methods. On the basis of these results, preference is to be given the König method, but, owing to the fact that average figures from numerous analyses with the method are lacking, the Henneberg-Stohmann method must be resorted to for the present at least.

The method for determining the incrusting substances was found by the author to be cumbersome and costly and to yield variable results. The author believes that the results of the crude fiber determination would not be a fair criterion for detecting rice spelts in wheat bran, but can be absolutely relied upon in determining the spelts in rice feeds and fertilizers. See also previous notes (E. S. R., 9, p. 220; 23, p. 110).

Color reactions for oils, J. Royer (*Ann. Falsif., 3 (1910), No. 23, pp. 380–385*).—The author examined 5 genuine samples of poppy oils, 3 of which were northern oils, 1 being cold pressed oil, 1 hot pressed, and the third heated after refining. After determining some of the chemical and physical constants, he submitted the oils to the Bellier and to the Villavecchia-Fabris reactions.

From these tests it is seen that the first pressing oils do not give the reaction for oil of sesame, but oils which are prepared for ordinary commercial purposes (hot pressed) often do, this perhaps to some extent because sesame oil and poppy oil are often made on the same press. It is further noted that the 2 reactions are not sufficiently characteristic to say definitely whether oil of sesame is present, and the author therefore recommends the determination of the chemical and physical constants in addition, when adulteration is suspected.

---

[a] Landw. Jahrb., 1877, Sup., p. 103; Jour. Landw., 21 (1880), p. 273; Die Untersuchung Landwirtschaftlich und Gewerblich wichtiger Stoffe, Berlin 1891, p. 235.

[b] Ztschr. Untersuch. Nahr. u. Genussmtl., 6 (1903), No. 17, p. 769.

The utilization of tomato cannery refuse, P. ACCOMAZZO (*Riv. Agr.* [*Parma*], *16* (*1910*). *Nos. 24, pp. 371, 372; 25, pp. 387–389; 26, pp. 401–403; 27, pp. 417–420; 28, pp. 433–435; 29, pp. 450–453; 30, pp. 465, 466; 31, pp. 481–484; 32, pp. 497–499; 34, pp. 531–533; 35, pp. 545, 546; 36, pp. 561, 562; 37, pp. 578, 579; 38, pp. 593–595; 39, pp. 611–613; 40, pp. 625–627; 42, pp. 658, 659; 43, pp. 673, 674; 44, pp. 689–691; 45, pp. 706, 707*).—The author points out the uses to which the refuse from tomato conserving plants can be put. He notes its physiological-chemical composition, its value as an animal food, both for fattening and milk production, its nutritive value, its use in conjunction with other feeds, its value as a fertilizer (E. S. R., 22, p. 325), as a source of oil for soap stock, as a fuel, etc., the methods of drying the material and extracting the oil, and the machinery employed for this.

Canning peaches on the farm, H. P. GOULD and W. F. FLETCHER (*U. S. Dept. Agr., Farmers' Bul. 426, pp. 26, figs. 14*).—This publication discusses the successful canning of peaches on the farm, under the heads of extent and location of the peach-canning industry, principles underlying successful peach canning, equipment, accessories, cans, handling the fruit for canning, grades of canned peaches, maturity of fruit for canning, preparing the fruit for the cans, exhausting, tipping, processing, and marketing the canned product.

METEOROLOGY—WATER.

Improving the forecasts, A. G. MCADIE (*U. S. Dept. Agr., Bul. Mount Weather Observ., 3* (*1910*), *pt. 4, pp. 235–238*).—The correlation of compensating meteorological conditions, particularly atmospheric pressure, in different so-called centers of action as an aid to forecasts in Japan and on the Pacific coast of the United States is briefly discussed, and the importance to the Pacific coast forecasts of the movements of great pressure areas over the Pacific Ocean is pointed out. Two general laws relating to such movements as affecting meteorological conditions on the Pacific coast are given. A brief bibliography of the subject is appended.

The Gulf Stream—and climate and crops in northern Europe, J. JOHNSTONE (*Sci. Prog. Twentieth Cent., 4* (*1910*), *No. 15, pp. 474–491, figs. 6*).—This article is based largely upon recent memoirs of general interest, particularly those reporting work of Norwegian hydrographers, and explains the influence of the Gulf Stream upon the sea temperature and air temperature and the growth of crops in northern Europe. The observations reviewed show not only that the climates of Norway and Sweden, and to a less extent of the British Isles, are much milder than would be the case if the Gulf Stream did not reach those shores, but also "indicate the probability that the character of the seasons in the Scandinavian countries may be predicted about six months to a year ahead; while that of the sea off the Murman coast might be foretold about two years in advance."

On the meteorological evidence for supposed changes of climate in India, G. T. WALKER (*Mem. Indian Met. Dept., 21* (*1910*), *pt. 1, pp. 21, pls. 7; rev. in Nature* [*London*], *84* (*1910*), *No. 2128, p. 178*).—From a review of available meteorological data, especially that relating to monsoon rainfall, the following conclusions are drawn: "The recent deficiency of monsoon rainfall in a large part of central and northwestern India must be attributed to something abnormal in the larger movements of the atmosphere and not to human agency in India; the deficiency has not lasted long enough to justify the conclusion that there has been a permanent change of climate; and there are marked indications of a return to good seasons."

The influence of the moon on vegetation, VON OLLECH (*Gartenwelt, 14 (1910), No. 18, pp. 213, 214*).—Various crops planted in the new moon, first quarter, full moon, and last quarter showed a very slight variation in yield in favor of full moon planting. It is pointed out that this variation may have been due to other factors.

Air and water, G. BLEUEL (*Jahresber. Agr. Chem., 3. ser., 12 (1909), pp. 3–38*).—This is a review of recent scientific literature on these subjects similar to those of previous years.

Bulletin of the Mount Weather Observatory (*U. S. Dept. Agr., Bul. Mount Weather Observ., 3 (1910), pt. 4, pp. 201–274, figs. 9, charts 6*).—This number contains the following articles: Variations of Temperature and Pressure at Summit and Base Stations in the Rocky Mountain Region (illus.), by A. J. Henry; Recent Publications Relating to Aerology, by C. F. Talman; Studies in the General Circulation of the Atmosphere, by F. H. Bigelow; Photographs of the Aurora Borealis and a New Method of Measuring Its Altitude, by C. Stoermer; Improving the Forecasts, by A. G. McAdie (see p. 311); On Passing Through the Tail of Halley's Comet, by W. J. Humphreys; and Free Air Data at Mount Weather for July, August, and September, 1910 (illus.), by W. R. Blair.

Monthly Weather Review (*Mo. Weather Rev., 38 (1910), Nos. 9, pp. 1309–1468, figs. 5, charts 33; 10, pp. 1469–1624, figs. 11, charts 33*).—In addition to the usual climatological summaries, weather forecasts and warnings for September and October, 1910, river and flood observations, lists of additions to the Weather Bureau library and of recent papers on meteorology and seismology, a condensed climatological summary, and climatological tables and charts, these numbers contain the following special papers:

No. 9.—Dry Farming in the East, by L. H. Bailey; Average Stream Flow of the Santee River System in South Carolina, by J. W. Bauer; Conservation of Flood Waters of the Colorado River, by B. Bunnemeyer; Early Rain at Fresno, Cal., in September, by W. E. Bonnett; Conservation of the Purity of the Air—Prevention of Smoke (illus.), by A. G. McAdie; The Fort Hall Irrigation Project, Idaho, by J. J. Granville; Payette-Boise Project, Idaho (illus.), by F. W. Hanna; Frost Prevention Work in the Rogue River Valley, Oreg., During the Spring of 1910, by P. J. O'Gara (see p. 342); and The Experiment Station at Wagon Wheel Gap, Colo. (illus.), by H. C. Frankenfield.

No. 10.—Effects of the Erection of New and High Buildings on the Records of Wind Velocity and Direction at the New York Weather Bureau Office (illus.), by E. S. Nichols; The Tropical Hurricanes of October, 1910 (illus.), by C. F. von Herrmann; Heavy Rainfall in the Ohio Valley, October 3–6, 1910, by F. J. Walz; Duty of Water, by A. L. Fellows; Forest Fires of 1910 and Their Causes, by L. N. Jesunofsky; Sixty Years of Rainfall in California (illus.), by A. G. McAdie; and Forecasts for Raisin Makers, by W. E. Bonnett.

Report of chief, meteorological division, J. LYLE (*Dept. Agr. Orange River Colony, Ann. Rpt., 5 (1908–9), pp. 189–219*).—Tables are given which show the average rainfall for each district of Orange River Colony during the year ended with July, 1909; also the rainfall at certain selected stations as compared with the average for preceding years, and records of temperature and pressure for various places during the same period.

Some observations of dew at Kimberley, J. R. SUTTON (*Sci. Proc. Roy. Dublin Soc., n. ser., 12 (1910), No. 24, pp. 266–274*).—From data secured in a series of observations on the formation of dew under clear and cloudy skies the conclusion is drawn that "dew making is not a function of the clearness of the sky merely, but rather of the dampness of the air and the length of the night."

[Local variation of rainfall in the counties of Dublin, Wicklow, Kildare, and Meath, Ireland], W. J. LYONS (*Sci. Proc. Roy. Dublin Soc., n. ser., 12 (1910), No. 30, pp. 354–373, map 1*).—Summarizing the available rainfall records for this region, the author finds a clearly defined dependence of the distribution of the rainfall on the marked configuration of the country, the rainfall increasing with the elevation, with the slope as distinct from the height of the elevated area, with the position of the slope with reference to the direction of the wind, and with the extent of the sea or evaporating area over which the wind has previously passed.

A study of rain frequency indicated "that the great differences observed in annual rainfall over a limited area are generally not due to rain days being more frequent in the mountains than in the low-lying districts, but rather to the rain being more intense, or possibly more prolonged in the course of each rain day."

Water powers of the Cascade Range.—I, Southern Washington, J. C. STEVENS (*U. S. Geol. Survey, Water-Supply Paper No. 253, pp. 94, pls. 21, figs. 3*).—This bulletin is the first of a proposed series dealing with the water powers of the streams flowing from the Cascade Range in Washington and Oregon, and gives the results of measurements and estimates of water power in the drainage basins of the Klickitat, White Salmon, Little White Salmon, Lewis, and Toutle rivers.

Surface water supply of the South Atlantic coast and eastern Gulf of Mexico, 1909, M. R. HALL and R. H. BOLSTER (*U. S. Geol. Survey, Water-Supply Paper No. 262, pp. 150, pls. 5*).—This is one of the series of papers on the surface water supply of the United States, and contains results of flow measurements on the principal streams of the South Atlantic and eastern Gulf of Mexico drainage systems.

Surface water supply of the St. Lawrence River basin, 1909, C. C. COVERT, A. H. HORTON, and R. H. BOLSTER (*U. S. Geol. Survey, Water-Supply Paper No. 264, pp. 130, pls. 5*).—This is one of the series of papers on the surface water supply of the United States and gives the results of flow measurements of streams in the St. Lawrence River basin.

The underground waters of north-central Indiana, S. R. CAPPS and R. B. DOLE (*U. S. Geol. Survey, Water-Supply Paper No. 254, pp. 279, pls. 7, figs. 12*).—This paper reports a study of conditions met in endeavoring to obtain supplies of underground water over an area of 7,611 square miles in north-central Indiana. The geography and general geology of the region are also described. "The conditions in 378 cities, towns, and villages were investigated, and a considerable amount of work was done in the country districts between these communities. Especial attention was paid to the water conditions in communities having public supplies. . . . More or less complete records of about 1,200 wells were procured. . . . In all, 83 areas in which flowing wells occur were visited and their outlines mapped."

It is stated that there are few places in the area investigated where enough water for domestic purposes can not be obtained at moderate depths. "Difficulties are often met, however, in obtaining wells of sufficient yield for public supplies or for manufacturing purposes where large quantities of water are needed."

Recommendations are made as to possible improvements where public water supplies are inadequate or show bad sanitary conditions.

Wells furnish most of the water for drinking and for general domestic purposes in this region of Indiana. Many of these well waters contain so much free hydrogen sulphid that they are unfit for use. They also as a rule contain a high percentage of chlorids, but this is not due to animal pollution. The hardness ranges from 150 to 500 parts per million and seldom falls below 200 parts. "Considered as to bacteriological purity the well waters of north-central Indiana are good."

Underground waters for farm use, M. L. Fuller (*U. S. Geol. Survey, Water-Supply Paper No. 255, pp. 58, pls. 17, figs. 27*).—This paper states that of the needs of the farmers of the United States "few are greater than that of purer water supplies. Farms, which are generally remote from towns, cities, or other areas of congested population, seem to be almost ideally situated for obtaining pure and wholesome water. In reality, however, polluted water is exceedingly common on them and typhoid-fever rates are usually greater in country districts than in cities. Typhoid fever is now almost universally believed to be transmitted solely through drink or food taken into the stomach, and is especially liable to be communicated by polluted waters obtained from shallow wells near spots where the discharges of typhoid patients have been thrown upon the ground and subsequently carried down through the soil and into the wells, and it is doubtless principally this fact that makes the disease so common in farming regions.

"Many of the failures to protect adequately the water supplies used for drinking arise from a lack of knowledge of the manner in which waters circulate through the ground and of the ways in which they may become polluted. Information on these subjects must needs be of value, and it is with the object of supplying this information in so far as it may be possible to furnish it in a brief paper, that the present report has been prepared."

The paper discusses sources of water supply, underground waters (springs and wells) and their protection, cisterns, and the combination of wells and cisterns. Discussing the relative safety of water from different water-bearing materials the author states that in general waters from sands and gravels if taken from a considerable distance below the surface are safe to use. Waters from clay are likely to be mineralized, but are as a rule free from contamination. Waters from till, sandstone, conglomerate, quartzite, shale, and slate are generally free from contamination. Waters from limestone, particularly in the vicinity of buildings or settlements, are frequently contaminated and unfit for use. "This is not because of the amount of lime dissolved, but because of the fact that the water falling on the surface as rain often plunges directly through basins or sinks into the underground channels instead of slowly filtering downward through the soil and into the rock, as in most other materials. This water carries with it the impurities washed or otherwise brought to the sink and bears them along through underground passages to distant points."

On account of the joints and fissures which occur in granite, gneiss, and schist, waters from these rocks are frequently contaminated, particularly in cities and other thickly populated regions.

"Of the various sources of water supply the ground water is the most satisfactory for farm use, because it is least liable to pollution, and streams and ponds are the most unsatisfactory, because of the ease and frequency with which they are contaminated. Fortunately, however, the latter are very seldom used for drinking and domestic purposes, being utilized mainly for stock, on which the effect of moderate pollution is not apparent. The underground supplies, whether from wells or springs, although safe in many localities, are far from being universally so, the safety depending mainly on their location and on the nature of their protection."

When carefully made, cisterns are generally safe to use, and cistern water being very soft is highly prized for domestic purposes.

Sterilization of large quantities of water by ultraviolet rays, Urbain, C. Scal, and A. Feige (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 18,* *pp. 770–772*).—An improved apparatus giving more thorough action of the ultraviolet light on water is described. It is stated that with this apparatus perfect sterilization was accomplished at an expenditure of 20 watts per cubic meter of water.

The results of sterilization experiments on the Cambridge water, G. S. WOODHEAD (*Proc. Cambridge Phil. Soc., 15 (1910), No. 6, pp. 559–573*).—The successful use of bleaching powder for the sterilization of the water is discussed, and a method in which complete sterilization was obtained without the necessity of using sodium bisulphite to destroy the excess of chlorin is described.

Agricultural utilization of the sewage waters of Strassburg, C. CLODOT (*Monatsber. Gesell. Förd. Wiss. Ackerb. u. Künste Unter-Elsass, 44 (1910), No. 2, pp. 109–127*).—The experience of other cities in disposing of sewage by using it for agricultural purposes is described, and the applicability of this method of disposal to the city of Strassburg is discussed. The great obstacle in the way of the use of methods of sewage irrigation is stated to be the difficulty of securing a sufficient area of suitable land for the purpose.

SOILS—FERTILIZERS.

Chemical characteristics of western prairie soil, F. T. SHUTT (*Rpt. Brit. Assoc. Adv. Sci., 1909, pp. 708–710*).—As a result of analyses of 200 samples of soil collected from different parts of the Great Plains region of Canada it is stated "that the essential and distinguishing feature of the western prairie soils is their high organic matter and nitrogen content. . . . They contain for the most part fairly abundant stores of phosphoric acid, potash, and lime."

The nitrogen content of the Manitoba soils examined ranged from 0.2 to 1 per cent, of Saskatchewan soils from 0.2 to 0.5 per cent, and of Alberta soils from 0.3 to 0.5 per cent. As a rule, however, the percentage of nitrogen decreased toward the westward, indicating a direct relation between the rainfall and the amount of nitrogen accumulated in virgin prairie soil. The water-holding capacity of these soils, rich in humus, is very large. The system of grain growing now in practice on some of the lands results in a large loss of nitrogen annually.

On the petrographic and soil conditions of the red sandstone (buntersandstein) formations in Germany, E. BLANCK (*Jahresh. Ver. Vaterländ. Naturk. Württemb., 66 (1910), pp. 408–506*).—Following a general résumé of the significance of geological formations in the study and classification of soils, the author reports extended data on the red sandstone formations of Germany. A general discussion of the geological formations of the soil is given, and mechanical and chemical analyses are reported.

The characteristics of "schlier" soils, H. GRUNER (*Landw. Jahrb., 39 (1910), No. 4–5, pp. 613–622*).—This article reports the results of mechanical, physical, and chemical studies of "schlier" soils from St. Martin, Haag, Sigharting, and Kirchberg, Austria, and of loess soils from Passau and Meissen, Saxony. In general the term "schlier" signifies types of soil, of varying geological formation, which readily wash or slide on account of their fine sandy, clayey, or marly nature.

As compared with analyses made in 1858 the St. Martin soil of the present time shows a higher calcium, magnesium, and potassium content, whereas the phosphorus, nitrogen, and humus content is somewhat lower.

The origin of the "wattpolder" soils of the North Sea coasts, MANSHOLT (*Mitt. Deut. Landw. Gesell., 24 (1909), Nos. 1, pp. 7, 8; 2, pp. 20–25, fig. 1; 25 (1910), No. 41, pp. 598–601, fig. 1*).—These articles present a new theory regarding the source of the "schlick" (clay) particles of the beach polders (wattpolder) soils formed by the action of the ebb and flood of the tide. The author believes that the fine, suspended (schlick) particles which are observed in the shoal water on the beaches where the polders form are derived mainly from the excrement of a sand worm (*Arenicola piscatorum*) that feeds upon the sands of the beaches.

Results of pot experiments with oats showed that the sand, very poor in plant food, is rendered comparatively fertile upon passing through the body of the worm.

Black soil and lime crusts in Morocco, T. FISCHER (*Ztschr. Prakt. Geol., 18 (1910), No. 3, pp. 105–114; abs. in Chem. Zentbl., 1910, I, No. 24, p. 1985*).—It is stated that this soil, which is widely distributed in Morocco, is very productive with annual plants but does not support tree growth owing to its shallowness and the scarcity of rainfall during the summer months. Results of microscopic examination show the soil to contain a large number of small mineral particles foreign to the underlying rock strata. The author believes that the soil contains eolian deposits, the sand particles being carried by the wind and deposited where vegetation and moisture tend to hold them in place. A high water-holding capacity and high organic matter content are important characteristics of the soil.

Investigations on the black soil of Morocco, A. SCHWANTKE (*Ztschr. Prakt. Geol., 18 (1910), No. 3, pp. 114–119; abs. in Chem. Zentbl., 1910, I, No. 24, p. 1985*).—Results of microscopical and chemical investigations strengthen the views held by Fischer (noted above) regarding the eolian origin of these soils.

The mechanical analysis of soils of Java, E. C. J. MOHR (*Bul. Dépt. Agr. Indes Néerland., 1910, No. 41, pp. 33, pl. 1; Teysmannia, 21 (1910), No. 7, pp. 455–471, pls. 3*).—The author calls attention to the fact that on account of the rapid changes which go on in soils in tropical countries like Java, mechanical analysis at any given time is of less value than in case of soils of temperate regions, and it is more necessary to follow closely the changes going on in the soil.

The methods used (based to a large extent on those of the Bureau of Soils of this Department) are described, as well as methods of stating and interpreting the results of mechanical analysis. A graphic classification by means of an equilateral triangle, the three points of which are sand $>50\mu$, silt 50–5μ, and clay $< 5\mu$, is explained.

The author's results indicate that mechanical analysis does not always furnish a basis for an exact classification of soils. He is of the opinion that determination of hygroscopicity as proposed by Mitscherlich is often a simpler and, for practical purposes, a better method of classifying soils, although it can never entirely take the place of careful mechanical analysis in the investigation of soils.

Soil waters, J. B. HARRISON and F. A. STOCKDALE (*Rpt. Expt. Agr. Work Dept. Sci. and Agr.* [*Brit. Guiana*], *1908–9, pp. 16–21*).—This is a report of a continuation of the study of the composition of soil and subsoil and underground waters on the experimental farm of Demerara at Georgetown, showing that there was a great increase in ammoniacal nitrogen and decrease in nitric acid in the soil water of a wet season as compared with a dry season.

Water taken from a depth of 12 ft. from an exceedingly fine grained sand called "caddy" showed a relatively high proportion of nitrogen present in the form of ammonia and of organic matters with a relatively low proportion as nitrates.

A soil of low fertility showed a high proportion of magnesium to calcium in both the clay and sand, the molecular ratio in the former being 1 of calcium to 6.6 of magnesium, and that of the sand 1 of calcium to 7.08 of magnesium.

The proportion of sulphate decreased with the depth at which the water was obtained.

The proportion of ions in the deep water from two fields, one old and the other new, as compared with those present in normal sea water indicate that "the sulphate ion present in the sea water, from which the majority of the salts were doubtless directly or indirectly derived, has been replaced by the carbonate ion, the proportion of calcium has been somewhat reduced, that of the potash somewhat increased, whilst the proportions of magnesium and of sodium have been increased at rates of nearly 20 per cent, the additions, probably derived from the land, being in the form of carbonates."

Taking the weight of an acre-foot of the soil just below the water table as 4,273,360 lbs., with a water content of 42.8 per cent, estimates are made of the amounts of various solid constituents in the water of an acre-foot of soil. These show that "the soil waters in the fertile parts to a depth of 12 ft. from the surface contain in one acre about 43 tons of sodium chlorid (common salt), 3¾ tons of magnesium carbonate, 3½ tons of magnesium sulphate, 2 tons of magnesium chlorid, 1 ton of potassium chlorid, 4 cwt. of sodium carbonate, and nearly 3 tons of calcium carbonate.

"On the nonproductive section the quantities of sodium chlorid and potassium chlorid are similar in amount to those on the fertile parts, but the total magnesium salts, which are a little less than in the fertile land—9 tons as compared with 9.3 tons—contain, in round figures, 6 tons of magnesium carbonate in place of 3¾ tons, whilst only about half as much (1⅝ tons) of calcium carbonate is present in it as there is in the fertile land."

In experiments in which (1) soil water was allowed to evaporate into the air and (2) caused to evaporate into an atmosphere consisting almost entirely of dry carbon dioxid, it was observed that "where the evaporation takes place in air nearly free from carbonic-acid gas, practically the whole of the calcium salts are deposited as calcium carbonate whilst the water is being concentrated to about one-third of its original bulk, and the remaining water becomes a highly saline one containing large proportions of magnesium salts—the chlorid, sulphate, and carbonate—in solution. The calcium salts, which are well known to exercise a profound influence in reducing the highly toxic action of the magnesium chlorid and carbonate on plants, are almost completely removed from solution and the soil water becomes in a condition which is poisonous to vegetation. This is what probably takes place during periods of prolonged dry weather on more or less wornout sugar-cane soils in which, by injudicious cultivation and especially by long-continued destruction of the trash by burning, the normal proportions of organic matter have been largely reduced. Where, on the other hand, the evaporation takes place in an atmosphere heavily charged with carbonic-acid gas as is the air present in soils containing the proportion of organic matter normal to good soils, the lime salts remain in solution until the liquid commences to become a saturated brine and thus for a prolonged period continue to modify the toxic action of the magnesium salts. It is possible on such land that the soil water during drought may become concentrated in the upper layer of the soil without very material injury to the plants until, by concentration of the soil water, the toxic action of the sodium chlorid exerts itself."

Results of observations on evaporation from sod, 1897–1907, V. Shipchinskiĭ (*Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 2, pp. 161–177*).—Observations on evaporation from sod by means of a special form of apparatus are reported. The apparatus used was a modification of that devised by Rykachev and consisted of a reservoir sunk in the soil to its top with an inner box 40 by 25 by 30 cm. in size, into which a piece of sod was closely fitted. The bottom of this box was perforated with holes 1 mm. in diameter and was in contact with water which was kept at a height of 5 cm. in the reservoir. Weighings were made three times a day.

The apparatus was designed with a view to imitating as closely as possible natural conditions, and the observations with it showed a much lower rate of evaporation than that indicated by Wild's evaporimeter. Furthermore, there was no regularity in the variations between the two sets of observations. The observations indicate that under natural conditions the evaporation was greater than precipitation during the summer.

Observations were made by the same method on bare soils and on soils planted to oats. These showed a wide variation in the evaporation under different methods of handling the soil. The author expresses the opinion that the apparatus used gives reliable and comparable data on evaporation, making it possible to determine the water actually used by plants and that remaining in the soil.

The functions, availability, and conservation of soil moisture in crop production, F. H. King (*Rpt. Brit. Assoc. Adv. Sci., 1909, pp. 713, 714*).—This article discusses the amount of water required to produce a unit of dry matter in crops, the physical conditions affecting the availability of the soil water for crop uses, and soil mulches for conserving the moisture of the soil.

"The author recommended growing cereals in strips 2 ft. wide, leaving 2 ft. as cultivated fallow between the strips. In the following year the strips are alternated, so what is now fallow will next year be cultivated, and vice versa. He considers this better than the usual arrangement of leaving the whole field fallow in alternate years."

See also a previous note (E. S. R., 22, p. 124).

Moisture studies of semiarid soils, F. J. Alway (*Rpt. Brit. Assoc. Adv. Sci., 1909, pp. 698, 699*).—This is a summary of investigations which have been noted from another source (E. S. R., 20, p. 714).

Results of irrigation of szek (alkali) soil meadows, K. Röszler, Jr. (*Kísérlet. Közlem., 13 (1910), No. 4, pp. 428–446*).—The character of the szek or alkali soils of the Hungarian Alföld (E. S. R., 20, p. 818) is described and experiments are reported which showed that irrigation in connection with fertilizing with phosphates and nitrates greatly increased the yield of hay on a field of such soil. Harrowing in the spring, however, decreased the yield.

Shallow versus deep cultivation on sandy soils, Biederstedt (*Illus. Landw. Ztg., 30 (1910), No. 75, pp. 707, 708*).—Two fields of sandy soils were cultivated, one to a depth of 4 in., the other to a depth of 7 in., and planted to lupines, rye, and potatoes during the three years of the investigation. Both fields received the same application of kainit, Thomas slag, and barnyard manure during the first, second, and third years, respectively.

The deeply cultivated soil gave decidedly greater yields than shallow cultivation in all cases. A noteworthy point brought out in the investigation was the drought-resisting ability of the rye on the deeply cultivated soil during the season of 1904, Thomas slag being used as fertilizer.

The nitrifying energy of soils, its determination and importance in soil fertility, Vogel (*Fühling's Landw. Ztg., 59 (1910), No. 18, pp. 626–636, fig. 1*).—This article reviews recent investigations bearing on this subject and reports laboratory experiments on the rate of nitrification of horn meal in soil (5 gm. of meal to 500 gm. of soil) and in field experiments with different kinds of soils treated in various ways. The rate of nitrification varied widely with the time of year, being highest in October and November, then falling steadily until April, when it rose again but not so high as in the autumn.

The treatment of the soil had less effect upon nitrification than the time of year, although the application of straw greatly reduced the nitrifying power of the soil. Heavy applications of calcium carbonate did not appreciably affect nitrification, but the addition of peat increased it to a marked degree. The results with applications of clay to the soil were inconclusive.

Experiments with potatoes and barley on the soils indicated that the productiveness was in direct relation to the nitrifying capacity. Plowing under of straw decidedly decreased the yield. The author suggests that by the application of straw in the fall nitrification may be retarded and loss of nitrogen reduced and that it may be possible so to regulate the nitrification process as to produce plants low in nitrogen.

Nitrogen economy of arable soils.—II, T. Pfeiffer, A. Guttmann, and F. Thiel (*Mitt. Landw. Inst. Breslau, 5 (1910), No. 5, pp. 657–713; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 572, II, pp. 535, 536; Zentbl. Agr. Chem., 39 (1910), No. 12, pp. 793–797*).—This article reports the results of a large number of pot experiments made to ascertain the amounts of nitrogen fixed by soil in its natural state after fallow, oats, and mustard; in the same soil sterilized by steam under three atmospheres pressure and by carbon bisulphid; and in soil to which sugar was added. Pots holding 13 kg. (28.66 lbs.) of loam were used. Data for yields and nitrogen in crops and soils are given.

There were gains of nitrogen in every case. The greatest gain after fallow was in soil treated with carbon bisulphid (1.275 gm. per 13 kg. of soil), the next largest in steamed soil (1.031 gm.), and in the natural soil the gain was 0.901 gm. The crop grown on steamed soil contained the highest nitrogen content. Carbon bisulphid had little effect upon the nitrogen content of the crop, but the addition of sugar reduced the amount of nitrogen taken up by the plant, although the soil showed a distinct gain in nitrogen. The total gain in soil and crop was practically the same without sugar as with it. The untreated natural soil showed gains of nitrogen in addition to that taken up by the crops. In sand cultures there was a very slight gain of nitrogen accompanying a luxuriant growth of soil algæ.

The nitrogen problems of dry farming, F. J. Alway (*Rpt. Brit. Assoc. Adv. Sci. 1909, p. 710*).—See a previous note (E. S. R., 22, p. 221).

Pineapple culture.—VII, Nitrates in the soil, A. W. Blair and R. N. Wilson (*Florida Sta. Bul. 104, pp. 31–51, figs. 4*).—In connection with the series of studies on pineapple culture (E. S. R., 22, p. 640), the authors investigated the formation and accumulation of nitrates in a coarse white sand, containing over 99 per cent of insoluble matter, which had been planted to pineapples since 1901 and had received two applications annually of a fertilizer containing 5 per cent of nitrogen at rates of from 2,250 to 4,500 lbs. per acre. The nitrogen of the fertilizer was supplied by dried blood, cotton-seed meal, nitrate of soda, castor pomace, and steamed bone meal.

Nitrates were determined in 10 sets of samples of the soil, taken usually at intervals of 4 to 6 weeks. There was a decided increase of the nitrates with increase of nitrogenous fertilizers. The nitrates were most abundant at the surface. The amount was small beyond a depth of 1 ft, but increased slightly from the second to the fifth foot. The nitrates were more abundant where the surface soil was protected by a covering of plants and decaying leaves. With heavy rainfall there was a falling off of nitrates, but an increase after the rain subsided although no fertilizer had been applied.

The highest average amount of nitrates for the whole period was found in the soil to which cotton-seed meal had been applied, the soils receiving dried blood and bone meal being next in order in this respect.

The humus content of cultivated soil and new land, and its solubility, M. Pankov (*Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 2,* *pp. 187–195*).—During 10 years plats representing 7 different kinds of soil were used for a regular rotation of crops, with a check plat on which no plants were grown except the natural vegetation, which was allowed to die and decay on the soil.

Determinations of humus in the soils of the different plats showed that the humus content of the uncropped soil was greater than that of the cultivated soil, and that the finer the particles of the soil the greater the humus. The water extract was neutral in the case of the cropped soil but acid in the case of the uncropped soil. The water extract of the cropped soil was less highly colored than that of the uncropped soil, but at the same time the amount of water-soluble substances in the uncropped soil was smaller than in the cropped soil. The water-soluble humus in the light open soils was higher than in the heavy soils.

The amount of carbon dioxid yielded by the water-soluble organic matter was practically the same in cropped and uncropped soils, indicating the same number of carbon atoms in the humus of the two soil types, although in varying degrees of oxidation. Oxidation by means of potassium permanganate showed practically the same results as regards total humus, but when applied to the water extract the results by this method varied widely from those obtained by the combustion method, indicating that the potassium permanganate method shows only humus of a certain stage of oxidation.

The humus acids of peat, A. STUTZER (*Deut. Landw. Presse, 37 (1910), No. 81, pp. 882–883; Illus. Landw. Ztg., 30 (1910), No. 82, pp. 769, 770; Ztschr. Angew. Chem., 23 (1910), No. 37, pp. 1760, 1761; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 19, p. 1171*).—This is a note on investigations by Baumann and Gully which have already been referred to (E. S. R., 23, p. 715), in which certain practical conclusions are drawn regarding the cultivation of upland moors.

On the basis of the investigations referred to, it is recommended that potash be used on such moors in liberal amounts, but only in the form of 40 per cent potash salt and not as kainit and carnallit, phosphoric acid in liberal amounts in the form of Thomas slag, and only so much burnt lime as is sufficient to neutralize the mineral acids set free in the soil from the potash salts used. The larger the amount of Thomas slag used, the less will be the quantity of lime required, and in many cases it may be entirely dispensed with.

On the humus acids of bleisand and ortstein, R. HORNBERGER (*Landw. Vers. Stat., 73 (1910), No. 1–3, pp. 221–233; abs. in Chem. Abs., 4 (1910), No. 19, p. 2703*).—The author finds from 63.5 to 64.1 per cent of carbon in the humus extract of bleisand (gray sand) and from 42.4 to 42.5 per cent in ortstein (hardpan). These results agree in general with those of Mayer (E. S. R., 15, p. 761; 16, p. 859) in showing a higher percentage of carbon in the humus of bleisand than in that of ortstein. The higher carbon content was associated with a lower ash content.

With the method used a large amount of alumina was precipitated with the humus and this alumina when heated to 120° retained as much as 36 per cent of water, with the result that the calculated composition of the humus was too high in hydrogen and oxygen and too low in carbon in some cases.

The author did not find in his experiments the reduction of the carbon content of the bleisand humus acids through the action of iron chlorid as reported by Mayer.

A contribution to the question of determination of the plant food content of a soil plat, H. KASERER (*Ztschr. Landw. Versuchsw. Österr., 13 (1910), No. 8, pp. 742–747, fig. 1*).—In view of the variation in plant food within very small areas, the author undertook a study on a plat of known history of methods of sampling to obtain reliable data as to the amount and distribution of plant food in the soil. His general conclusion is in harmony with conclusions from previous work at the same place, namely, that it is necessary to deal with composites of a large number of samples of soil carefully taken over the area of the plat, about one sample for each square meter being necessary.

The importance of a knowledge of the soil to colonial agriculture, P. VAGELER (*Tropenpflanzer, 14 (1910), No. 10, pp. 521–527*).—The importance of a knowledge of the soil to the pioneer farmer is pointed out.

The conservation of the fertility of the soil, A. D. HALL and E. J. RUSSELL (*Rpt. Brit. Assoc. Adv. Sci., 1909, pp. 710–713*).—This article covers practically the same ground as an article already noted (E. S. R., 23, p. 519).

Agricultural practice in the Indies, H. VAN WARMELO (*Cultura, 22 (1910), Nos. 262, pp. 317–329; 263, pp. 372–377; 264–265, pp. 437–448*).—This is a discussion of factors affecting the fertility of the soil, such as composition, soil flora and fauna, depth of surface soil, physical properties, and climatic conditions, which are beyond the control of man, and soil cultivation and improvement which are more or less within his control. The discussion applies particularly to conditions such as prevail in the Dutch East Indian possessions.

Soil robbery and fertilizing in the light of recent experiments, SCHNEIDEWIND (*Landw. Wchnschr. Sachsen, 12 (1910), No. 12, p. 93; abs. in Chem. Ztg., 34 (1910), No. 62, Repert., p. 241*).—Experiments which have been carried on for a number of years by the author indicate that under ordinary methods of intensive culture with liberal use of manure and fertilizers there was a marked depletion of the nitrogen and potash supply of the soil. There was a relative increase of the phosphoric acid under such a system.

Different kinds of stable manure as sources of phosphoric acid, M. A. EGOROV (*Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 2, pp. 178–186, fig. 1*).—Comparative tests were made of monopotassium phosphate, phytin, iron phosphate, monocalcium phosphate, and pigeon, cow, and horse manure in pot experiments with pure sand (8.8 lbs. per pot), the crop grown being oats. A basal fertilizer mixture of calcium nitrate, magnesium sulphate, potassium chlorid, and ferric chlorid was used, and the different materials named above were used in amounts furnishing 0.2838 gm. of phosphoric acid per pot.

It was found that in general the phosphoric acid of phytin was well assimilated by the oats. The phosphoric acid of the different kinds of manure was more assimilable than that of the normal culture solution. The amount of phosphoric acid assimilated was greatest in the case of horse manure, and this is in agreement with the results of analyses, which showed the largest amount of easily soluble phosphoric acid in this material.

The author is of the opinion that while the results of these experiments do not warrant generalizations they show that it is important to take into account not only the total phosphoric acid, but also the forms in which it occurs in manures.

The manurial value of different legumes, R. W. THATCHER (*Washington Sta. Popular Bul. 32, pp. 4*).—This publication reports the percentage of nitrogen in tops, roots, nodules, and whole plant of a number of legumes grown on the college farm in 1909, and discusses the needs of the soil of different parts of the State with reference to growth of legumes for green manure. The nitrogen in dry matter of the whole plant varied from 1.5 per cent in alfalfa to 3.5 per cent in Tangier pea (*Lathyrus tingitanus*), and that of nodules from 1.6 per cent in case of sanfoin to 6.92 per cent in case of alfalfa.

The action of ammonium sulphate and sodium nitrate, LINDENBERG (*Illus. Landw. Ztg., 30 (1910), Nos. 81, pp. 757, 758; 82, pp. 768, 769*).—A résumé of the results of various experiments shows that the relative efficiency of 100 per cent for sodium nitrate to 90 per cent for ammonium sulphate is correct in most cases. However, the ammonium sulphate gave better yields in a few instances than the sodium nitrate. From the results of his own experiment on sugar beets, with superphosphate and sodium nitrate as the basal fertilizer, the author found that a fall application of ammonium sulphate gave better yields than a spring application.

The solubility of organic forms of nitrogen in fertilizers, J. P. STREET (*Connecticut State Sta. Rpt. 1909–10, pt. 5, pp. 430–442*).—As preliminary to a study of the availability to crops of water-soluble and permanganate-soluble forms of nitrogen, and to devise if possible a laboratory method for determining the agricultural value of organic forms of nitrogen, the ammonia evolved on distillation with magnesia, the water-soluble, and the permanganate-soluble nitrogen were determined in 117 samples of organic nitrogenous materials used in fertilizer mixtures. These included 35 kinds of materials of all grades of agricultural value. The average results obtained with the principal materials are given in the following table:

Solubility of nitrogen of fertilizing materials.

Material.	Number of samples.	Nitrogen.					Solubility of organic nitrogen.	
		Total.	As ammonia.	As water-soluble organic.	As permanganate-soluble organic.	As insoluble organic.	Total.	Water-insoluble organic.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Dried blood	6	11.67	0.11	0.32	10.77	0.47	96	96
Hoof meal	2	15.00	.35	1.19	12.78	.68	95	95
Cotton-seed meal	5	7.03	.08	.68	5.85	.42	94	93
Bone	3	3.84	.00	1.12	2.56	.16	96	93
Dried fish	22	7.94	.67	1.69	5.07	.51	93	91
Tankage	29	5.80	.27	1.52	3.61	.40	93	90
Tankage (alleged)	2	5.57	2.33	.65	1.63	.96	70	63
Castor pomace	9	5.24	.08	.68	3.95	.53	90	88
Peruvian guano	2	5.40	1.77	1.11	2.02	.28	92	88
Garbage tankage	5	2.54	.07	.40	1.06	1.01	59	50
Sheep manure	5	2.42	.39	.38	.79	.86	58	48
Peat	4	2.89	.09	.08	1.13	1.59	43	42
Tobacco stems	4	2.51	.27	.52	.44	.68	59	39

These results indicate that digestion with a 2 per cent neutral solution of potassium permanganate "may offer a means of determining the approximate relative value of the organic nitrogen found in commercial fertilizers."

The method was applied to 252 samples of mixed fertilizers with the following results:

Solubility of nitrogen of mixed fertilizers.

Number of brands.	Total nitrogen.	Permanganate solubility of water-insoluble organic nitrogen.		Number of brands.	Total nitrogen.	Permanganate solubility of water-insoluble organic nitrogen.	
		Variation.	Average.			Variation.	Average.
	Per cent.	*Per cent.*	*Per cent.*		*Per cent.*	*Per cent.*	*Per cent.*
3	Under 1.00	56–60	58	65	3.01–4.00	56–98	81
16	1.01–1.50	50–85	65	32	4.01–5.00	37–97	87
32	1.51–2.00	46–91	71	8	5.01–6.00	71–94	86
49	2.01–2.50	48–93	74	2	6.01–7.00	92–94	93
43	2.51–3.00	51–92	73	2	Over 8.00	83–89	86

The solubility of the nitrogen of the mixed fertilizers agreed closely with that of the nitrogen of the materials used in the fertilizer, and showed that with few individual exceptions the high grade fertilizers (those containing the most nitrogen) had a higher nitrogen solubility than the low grade goods.

Pot tests of several of the nitrogenous materials on rye showed that all of the materials classed as inferior by determination of solubility in permanganate showed a decided inferiority to dried blood, which was used as a standard for comparison. Peat appeared to be almost worthless as a source of nitrogen, and the nitrogen of the other materials was found to be from about one-fifth to four-tenths as available as that of dried blood.

Nitric acid from air nitrogen (*Amer. Fert., 33 (1910), No. 11, pp. 26, 27, figs. 2*).—The operation of the Paulling process as applied at Innsbruck in Austria and La Roche de Rame near Briançon in the French Alps is briefly described. It is stated that this process is second in commercial importance only to the Birkeland and Eyde process.

Calcium cyanamid: Its analysis and the changes it undergoes when exposed to the atmosphere, C. BRIOUX (*Ann. Chim. Analyt., 15 (1910), No. 9, pp. 341–346; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 19, pp. 1171, 1172*).—This article describes the changes which calcium cyanamid undergoes when exposed to the air, and gives a method for determining the relative proportions of cyanamid and dicyandiamid in calcium cyanamid. This method is based upon the fact that calcium cyanamid or cyanamid yields, with an ammoniacal solution of silver nitrate, a precipitate which contains all of the cyanamid nitrogen, and further that silver nitrate in the presence of potassium hydroxid precipitates all three substances.

The decomposition of cyanamid by mineral constituents of the soil, II. KAPPEN (*Fühling's Landw. Ztg., 59 (1910), No. 19, pp. 657–679*).—From studies of the action of natural compounds of iron, manganese and aluminum, and of precipitated iron, aluminum, and manganese hydroxids, and of silicic acid on calcium cyanamid, as well as on the behavior of the cyanamid in soils, the author concludes in agreement with Stutzer and Reis (E. S. R., 23, p. 718), and with Ulpiani (E. S. R., 24, p. 226) that the decomposition of the cyanamid may be purely inorganic in character, although bacteriological action is not excluded.

Experiments with potash fertilizers, W. SCHNEIDEWIND, D. MEYER, and F. MÜNTER (*Landw. Jahrb., 39 (1910), Ergänzungsb. 3, pp. 247–253, pls. 2; abs. in Chem. Zentbl., 1910, II, No. 6, p. 406; Jour. Soc. Chem. Indus., 29 (1910), No. 17, p. 1070*).—These pot experiments included comparisons of phonolite with potassium chlorid and carbonate, and tests of the effect of sodium chlorid, sodium sulphate, magnesium chlorid, and magnesium sulphate applied with the phonolite on beets. The soil used was composed of 80 per cent sand from uncultivated land and 20 per cent clay loam from the Lauchstädt district.

With potatoes, beets, summer wheat, and a mixture of clover and grass on sandy clay loam, phonolite showed very little fertilizing effect, even the potash of the phonolite soluble in hydrochloric acid being much less effective than potassium chlorid and carbonate. The application of sodium chlorid and sodium sulphate with the phonolite increased the yield of fodder beets considerably, but magnesium sulphate did not increase the yield, and magnesium chlorid materially retarded it. The increase with sodium chlorid was greater than with sodium sulphate. Both sodium chlorid and magnesium chlorid increased the utilization of the soil potash, but with no increase in yield in the latter case.

The increase in the world's consumption of potash for agricultural purposes, MAIZIÈRES (*Engrais, 25 (1910), No. 44, pp. 1217, 1218*).—According to the figures given in this article the total consumption of potash for agricultural purposes was 2,701,715 quintals (about 297,189 tons) of pure potash in 1901 and 5,878,211 quintals (646,603 tons) in 1909. The largest consumers were Germany, 3,057,962 quintals (336,376 tons) and the United States, 1,476,143 quintals (162,376 tons).

[Meeting of scientists interested in the potash industry] (*Ztschr. Angew. Chem., 23 (1910), No. 41, pp. 1953–1957*).—This is an account of the meeting held at Halberstadt in October, 1910, of representatives of the Association of German Chemists and of the Society for the Scientific Advancement of the German Potash Deposits. Various papers bearing upon investigations on potash salts and deposits are noted.

Report on the geological investigation of phosphorite deposits, I, Government Kostroma, A. D. ARKHANGELSKIĬ, A. P. IVANOV, and Y. V. SAMOILOV (*Abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 2, pp. 234–236*).—Investigations of the phosphate deposits along the Volga and Unzha rivers indicated the presence of 150,000,000 poods (2,705,250 tons) of rather high grade phosphates and 80,000,000 poods (1,442,800 tons) of rather low grade phosphates in these deposits.

On the method of formation of tricalcic phosphate in Algeria and Tunis, J. ROUSSEL (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 13, pp. 600–602, figs. 2; abs. in Rev. Sci. [Paris], 48 (1910), II, No. 15, p. 477*).—It is held that at the time of formation these phosphates consisted of a mixture of calcium phosphate and calcium carbonate deposited under water, the deposition going on in some cases without interruption and in other cases with frequent interruptions, resulting in a replacement of the calcium carbonate. The author is of the opinion that the sedimentary tricalcium phosphate is of animal origin.

An important new source of phosphate, MAIZIÈRES (*Engrais, 25 (1910), No. 41, pp. 1132, 1133*).—Reference is made to deposits in the Mazapil Valley, Mexico, which are said to be of considerable extent.

The availability of the phosphoric acid of different phosphates, K. K. GEDROÏTS (*Trudui Selsk. Khoz. Khim. Lab. St. Peterb., 6 (1904–1907), pp. 343–405, figs. 18; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 2, pp. 228–230*).—Pot experiments with freshly precipitated, dried, and ignited phosphates of calcium, aluminum, and iron on barren sand (with flax and mustard) and on sandy chernozem (with flax, oats, and mustard) are reported. The effect of calcium carbonate and of different sources of nitrogen on the availability of the phosphoric acid was studied in these experiments.

The results on both the chernozem and the barren sand indicated that the availability and the effect of the different phosphates depended largely upon the kind of soil and plant used in the experiments. The iron phosphate was the least available without regard to kind of soil or crop. The comparative availability of calcium and aluminum phosphates clearly depended upon the character of soil and crop. Where the effect of the soil did not enter into account the aluminum phosphate was more available than calcium phosphate in case of mustard, but when the soil, and especially its supply of carbon dioxid, was the active factor there was no difference in the availability of these two phosphates. Even in this case, however, the aluminum phosphate was more available than calcium phosphate for flax and oats.

Without regard to the kind of nitrogenous fertilizer associated with them, all the phosphates were more readily assimilated by mustard than by flax and oats, and some were more readily assimilated by flax than by oats. Ammonium sulphate and ammonium nitrate increased the availability of the phosphoric acid of the soil and of the phosphates but did not always increase the yield. Calcium carbonate reduced the availability of calcium phosphate. On nearly neutral soils such as were used in these experiments, containing little free organic acids stronger than carbon dioxid, calcium carbonate slightly increased the availability of aluminum and iron phosphates.

Agricultural value of calcined and ground mineral phosphates, M. DE MOLINARI and O. LIGOT (*Ann. Gembloux, 20 (1910), No. 11, pp. 601–607, pls. 2*).—Two samples of such phosphate, containing 24.8 and 18.3 per cent of phosphoric acid, respectively, of which only a small proportion was soluble in ammonium citrate or citric acid, were compared with Thomas slag in pot experiments with oats grown on soil and sand. In no case did the calcined phosphate show any appreciable effect, while the Thomas slag showed a marked benefit.

Gypsum deposits of New York, D. H. NEWLAND and H. LEIGHTON (*N. Y. State Mus. Bul. 143, pp. 94, pls. 18, figs. 8, maps 4*).—This bulletin deals quite fully with the history of the gypsum industry in New York, the composition, character, and uses of gypsum, the general geology, distribution, and character of the gypsum deposits of New York, the permanence of the gypsum supply, the methods of prospecting and exploiting gypsum deposits, the origin of gypsum, the properties of gypsum and theory of its transformation to plasters, and the technology of gypsum plasters. It also contains a bibliography of papers and reports relating to the gypsum deposits of New York.

It is stated that "the most important use of raw gypsum is as a soil amendment, for which purpose the rock, pure or impure as it may be, is simply crushed and ground to a powder."

The use of land plaster is very ancient, but recently there has been a decided falling off in the land plaster industry, probably due to the development of other uses of gypsum.

Can the lime of calcium silicate serve as plant food? H. MIETH (*Landw. Vers. Stat., 74 (1910), No. 1–2, pp. 81–120*).—The author reviews other investigations bearing on this subject and reports water culture experiments on oats in which part of the lime of the culture solution was supplied by different forms of calcium silicate.

The lime of the silicate was taken up readily and without injury by the plant. There was no marked difference in growth with the different silicates used. The plants took up much more silicic acid than lime. The silicates were apparently decomposed by the life activities of the plant (excretion of carbon dioxid by the roots) with the production of free silicic acid and calcium carbonate. That the plant tried to obtain silicic acid was shown by the fact that those not supplied with this substance in the culture solution took up a small amount from the glass of the vessels in which the experiments were amde. Account should be taken of easily decomposable calcium silicate as a source both of lime and silicic acid.

The use of gas liquor for fertilizing purposes, H. RYGÅRD (*Jour. Gasbeleucht., 53 (1910), pp. 246, 247; abs. in Chem. Zentbl., 1910, I, No. 26, p. 2132*).—The gas liquor was neutralized with sulphuric acid, mixed with peat, and used only after it had been allowed to decompose for some time.

Report on commercial fertilizers, 1910, E. H. JENKINS and J. P. STREET (*Connecticut State Sta. Rpt. 1909–10, pt. 5, pp. 375–430, 442–454*).—This report gives the results of analyses and valuations of 661 samples of mixed fertilizers and fertilizing materials examined during the year.

The fertilizing materials included 22 samples of nitrate of soda, in which the average percentage of nitrogen was 15.24, the average cost of nitrogen per pound being 16.1 cts.; and 157 samples of cotton-seed meal, in which the average percentage of nitrogen was 6.79, and the average cost of nitrogen per pound was 24.7 cts. These figures, as well as those given for other organic sources of nitrogen, show that the nitrogen of nitrate of soda, which is unquestionably the most quickly and fully available form accessible, is also the cheapest at present prices.

Report of analyses of commercial fertilizers and Paris green, J. E. HALLIGAN (*Louisiana Stas. Fert. Rpt. 1909–10, pp. 76*).—This bulletin reports analyses and valuations of 6,599 samples of fertilizers and 1 sample of Paris green examined during the year 1909–10. The fertilizers examined included besides complete fertilizers and other standard fertilizing materials, 237 samples of bone meal, 829 samples of tankage, and 408 samples of cotton-seed meal. The quality of the different classes of fertilizers is discussed, and it is shown that there is a tendency for the complete fertilizers to be deficient in nitrogen.

Commercial fertilizers in 1909–10, G. S. FRAPS (*Texas Sta. Bul. 133, pp. 4–18, fig. 1*).—This bulletin reports analyses and valuations of fertilizers inspected under the Texas fertilizer law during the season 1909–10. It is stated that the quantity of commercial fertilizers exclusive of cotton-seed meal sold during the year in Texas was 34,000 tons as compared with 23,800 tons the previous year.

AGRICULTURAL BOTANY.

Soil bacteriological investigations, B. HEINZE (*Landw. Jahrb., 39 (1910), Ergänzungsb. 3, pp. 314–343; abs. in Chem. Zentbl., 1910, II, No. 6, p. 404*).—Investigations begun in 1904 on bacteriological conditions in fallow soils, on the assimilation of nitrogen by different kinds of bacteria, and on nodule-forming bacteria as related to the cultivation of leguminous plants, are reported.

It was found that repeated cultivation of fallow land materially increased the number of organisms, the number being highest in the summer months and lowest during the fall and spring. Phosphoric acid and potash apparently had no effect on the number of bacteria but aided materially in the breaking down of organic matter. The organic substances (straw, sugar, starch), as well as the organic nitrogenous compounds (asparagin, peptone, albumin), materially increased the number of organisms, although the inorganic nitrogenous compounds (sodium nitrate and ammonium sulphate) did not exert an appreciable influence in this respect. Among the most important soil organisms found in the fallow were those which ferment pectin compounds, cellulose, and humus, ammonifying and nitrifying organisms, and Azotobacter. For the assimilation of nitrogen, Azotobacter and other organisms require the presence of large quantities of organic substances (sugar, starch, cellulose, humus, etc.), the necessary mineral compounds, and a neutral or weak alkaline reaction of the soil.

The author describes a method of culture by which the original strength can be restored to Azotobacter which has apparently been greatly reduced in nitrogen-fixing power. Humus substances and phosphoric acid were especially favorable to the growth and nitrogen-fixing power of Azotobacter. The nitrogen which was assimilated by Azotobacter and fixed in form of protein compounds was quickly broken down again.

Lupine-sick and clover-sick soils were restored to normal condition by the application of inoculated serradella soil.

Hiltner's recent views regarding the two groups of legume organisms were not substantiated by these investigations, although his earlier conclusions regarding the identity of specific legume organisms were confirmed. All of the more recent observations show that serradella and lupines do not show any special preference for sandy soils. An important point brought out in these investigations is that utilization of the nitrogen of the soil and of the air goes on simultaneously and that there does not have to be a complete or even large depletion of soil nitrogen before the nodule-forming processes begin.

Some bacteriological relations in soils kept under greenhouse conditions, J. G. LIPMAN and I. L. OWEN (*Jour. Agr. Sci., 3 (1910), No. 3, pp. 301–310*).—The results are given of the effects of varying quantities of acid phosphate and citric acid on the number of colonies on agar plates, the influence of small additions of fertile soil on the bacterial content of quartz sand properly supplied with plant food, the number of bacteria in greenhouse soils as affected by the addition of organic matter and of cultures of *Bacillus mycoides*, and the influence of gypsum on the number of soil bacteria that form colonies on agar plates.

Considered in their entirety, these experiments indicate that in greenhouse soils there may be at first a very rapid increase of decay bacteria to numbers above the normal and then a gradual decline to numbers decidedly below the normal, while the nitrifying organisms become more prominent as the others gradually decrease. There were indications of periodicity in the increase and decrease of the decay bacteria in the soil, and it is possible that with a much longer period of observation, the numbers of bacteria-producing colonies on agar plates would rise again to very considerable proportions.

On measuring the activity of aerobic bacteria in the soil by the amount of carbon dioxid produced, F. H. HESSELINK VAN SUCHTELEN (*Centbl. Bakt. [etc.], 2. Abt., 28 (1910), No. 1–3, pp. 45–89, fig. 1*).—The author gives the results of experiments on the activity of soil micro-organisms, in which the amount of carbon dioxid evolved is used as a means of determining the intensity of their activity. By this method the effects on bacterial activity of pulverization, aeration, water content, frosts, the addition of different substances to the soil, such as dextrose, mannit, straw, minerals, etc., and of the partial sterilization of soils by carbon bisulphid, were tested, as well as the activity of soil bacteria at different depths and in different soils.

The method consists of passing a measured quantity of carbon-dioxid-free air for a given time through 8-liter flasks, each containing usually 6 kg. of the soil at a temperature of from 10 to 12° C., and then measuring the quantity of the carbon dioxid evolved.

Comparisons made of the results obtained by this method and those obtained under similar conditions by plate cultures show in many instances approximately equivalent results for the activities tested. It is therefore claimed that by the carbon dioxid method one can determine with accuracy the more important factors which influence the bacterial life of the soil, especially under ordinary field conditions.

The assimilation of ammonia, nitrate, and amid nitrogen by micro-organisms, S. BIEREMA (*Die Assimilation von Ammon-, Nitrat-, und Amidstickstoff durch Mikroorganismen. Inaug. Diss., Leipsic, 1909, pp. 83, pls. 7; abs. in Jahresber. Landw., 24 (1909), p. 41*).—The author claims that the microbiological utilization of most nitrogen compounds occurs both in crude and pure cultures under suitable conditions, that is, when the appropriate carbohydrate is present as a source of energy. He also states that molds can assimilate nitrogen compounds.

A further contribution on white mustard in its relation to nitrogen assimilation, O. LEMMERMANN ET AL. (*Landw. Vers. Stat., 73 (1910), No. 6, pp. 425–456; abs. in Illus. Landw. Ztg., 30 (1910), No. 75, p. 709*).—In a series of experiments similar to those previously reported (E. S. R., 20, p. 717), it was found that during the growing period soils on which white mustard was grown had a slight, but plainly evident, nitrogen increase over similar plant-free soils, but after the mustard was harvested there was no appreciable difference in the nitrogen content of the two soils.

The addition of sugar to the soils increased the nitrogen gain in each, but not more so in the mustard than in the plant-free soil.

The influence of fertilizers on straw (*Rev. Sci. [Paris], 48 (1910), II, No. 14, pp. 438, 439*).—This is a note on a review by J. Kissel of investigations by Vogeler and Thiele on the effect of various combinations of nitrogen, phosphoric acid, and potash on the growth of plants.

It was found that phosphoric acid thickened the cell walls and reduced the size of the cells, thus increasing the density of the straw. The opposite effect was produced by nitrogenous fertilizers. The results with potash on oats and grasses were inconclusive. Lime produced the same effect as nitrogen but to a less degree. The combined action of these four constituents thickened the cell walls but increased the size of the cells. A complete, well-balanced fertilizer produced better results as regards the cell structure than one-sided fertilizing.

The effect of various salts on the respiration of plants and upon respiratory enzyms, W. Zaleski and A. Reinhard (*Biochem. Ztschr., 27 (1910), No. 5-6, pp. 450-473*).—The authors state that the effect of various common salts on the activity of plants depends upon a number of factors, and they report a study of the action of potassium nitrate, dipotassium phosphate, disodium phosphate, calcium nitrate, potassium carbonate, magnesium sulphate, etc., on the respiration and respiratory enzyms of wheat, maize, peas, rape, and lupines, comparing the respiration of the plants grown in distilled water with those receiving varying amounts of the salts in solution.

In nearly every instance a depressing effect of the salt was noticed in the lowered respiration of the seedlings. In a similar way the effect of the neutral salts lowered the action of the enzyms, reductase, catalase, and zymase.

The authors hold that their experiments show that the salts in nutrient solutions have no stimulating effect on the respiratory enzyms of seeds and that whatever stimulation is exerted is due to other causes. Their effect is held to be an indirect one. Some, acting on the hydrolytic ferments, assist in the breaking down of the proteids and carbohydrates, while others assist in the synthesis of the protoplasm in the cells.

The action of ultraviolet rays on plants containing coumarin and also plants whose odor is due to the splitting of glucosids, Pougnet (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 12, pp. 566-569*).—Experiments were carried on with a quartz mercury lamp to test the action of ultraviolet rays on Melilotus, Asperula, Anthoxanthum, and Herniaria, which are characterized by the odor of coumarin, and on cress, horseradish, radish, and the leaves of cherry laurel, which owe their characteristic odor to the splitting of the glucosids contained in them.

The action of the ultraviolet rays soon resulted in the appearance of the characteristic odor in all the plants. The cells were found to be killed by the light rays, while the ferments remained active. In this respect the action of ultraviolet rays is said to be comparable with that of other agents which induce changes following the death of the cell.

The exchange of gases during the formation and destruction of anthocyanin, R. Combes (*Rev. Gén. Bot., 22 (1910), No. 257, pp. 177-212*).—A preliminary account of the author's investigations on the exchange of gases in the leaves of plants during the formation and disappearance of red coloring matter in the leaves has already been noted (E. S. R., 23, p. 528). In the present paper a full account is given of the experiments in which he studied the correlation between oxygen and anthocyanin in Rumex, Œnothera, Ailanthus, and other plants the foliage of which is characterized at times by a deep red coloration.

The author claims that the appearance of anthocyanin is correlated with an accumulation of oxygen in the tissues and its disappearance with a noticeable loss of that gas. The variation in the gas exchange is regulated by the chlorophyll activity; hence the formation of the red coloring matter is intimately connected with assimilation. The actual formation of the red pigment is due to the accumulation of carbohydrates in the cells, and perhaps the glucosids undergo a kind of oxidation by which they are transformed into anthocyanin.

The rôle of catalase in plants, ANNA ROSENBERG (*Ber. Deut. Bot. Gesell., 28 (1910), No. 7, pp. 280–288*).—A study was made of the catalase activity of various seeds, the seed being digested with water, allowed to stand for an hour, mixed with Merck's Perhydrol (hydrogen peroxid), and the oxygen given off determined by a manometer. A number of experiments were carried out with seeds representing cereals, leguminous plants, and oil-bearing plants, and also with wheat seedlings, which showed that the catalase acted as an aerobic ferment.

The chemistry of chlorophyll, R. WILLSTÄTTER (*Rpt. Brit. Assoc. Adv. Sci., 1909, pp. 667, 668*).—An abstract is given of a paper read by the author before the British Association in which he gives a summary of the present state of information relative to the chemistry of chlorophyll.

He claims that the older investigations showed little regarding the nature of chlorophyll, but that the recent discovery that phylloporphyrin, a degradation product, is closely related to derivatives of hæmin, is very important. The difference between chlorophyll and hæmin in regard to the metal held in their molecules is of vital importance. The author has established that the chlorophyll of all classes of plants contains magnesium and no other metal, and that the magnesium in the chlorophyll has an important part in the assimilation of carbon dioxid. He claims that failure to detect the presence of magnesium in chlorophyll is probably due to the fact that chlorophyll is very sensitive toward acids, which completely eliminate the metal.

In investigating the action of alkali on chlorophyll it was found that the continued action yields first green chlorophyllins, then blue glaucophyllin and red rhodophyllin, and finally red pyrrophyllin and phyllophyllin.

Gentle warming with acids has led to the discovery of phytol. This appeared to be present in nearly all plants examined, although it is not believed to be an essential component of chlorophyll. Out of more than 100 species of plants examined, only in a few species of Labiatæ and Solanaceæ was there any exception to the occurrence of phytol in the chlorophyll.

Perception of light in plants, H. WAGER (*Rpt. Brit. Assoc. Adv. Sci., 1909, p. 674*).—Attention has been previously called (E. S. R., 22, p. 26) to the suggestion of Haberlandt that light perception on the part of plants is a function of the cytoplasm lining the epidermal cell walls. The author thinks that on morphological and physiological grounds this is not a satisfactory explanation, and proposes the alternative view that the chlorophyll grains are the percipient organs. He claims that the rays of light which are absorbed by the chlorophyll are the only ones which appear to be functional in heliotropism, and that these by their action on the various coloring materials contained in the chlorophyll may set up in the cytoplasm changes necessary to bring about the stimulus.

The effect of longitudinal compression upon the production of mechanical tissue in stems, L. H. PENNINGTON (*Bot. Gaz., 50 (1910), No. 4, pp. 257–284, figs. 2*).—An investigation was undertaken with woody and herbaceous plants to determine experimentally the effect of weight which produced longitudinal compression in vertical stems. The experiments with woody plants were conducted in the garden during the spring and summer, while those upon the herbaceous plants were carried on in the greenhouse during the winter and in the garden during the summer.

The conclusions of the author are as follows:

"The four woody stems show no increase in mechanical strength or in the amount or kind of mechanical tissue under the influence of longitudinal compression.

"In young herbaceous stems the development of mechanical strength in the tissues is somewhat retarded by a longitudinal compression caused by comparatively heavy weights.

"Neither light weights nor heavy weights have any appreciable effect upon the growth and strength of herbaceous stems which have already formed a cylinder of mechanical or woody tissue.

"Continuous longitudinal compression causes no marked differences in the size or form of any part of the stem which is subjected to the compression, excepting of course mechanical changes which might be caused by excessive compression."

A bibliography is appended to the article.

The delayed germination of seeds, L. H. PAMMEL (*Rpt. Brit. Assoc. Adv. Sci., 1909, pp. 673, 674*).—A report is given of investigations on the germination of weed seeds, a preliminary account having been noted elsewhere (E. S. R., 15, p. 49) of earlier work, in which it was found that in general the effect of freezing and thawing was to increase the percentage of germination, especially of seeds with hard coats.

The later investigations were conducted with the seeds of 130 species of weeds, part of which were placed in paper packages and planted each month. Another lot was stratified in sand and subjected to Iowa conditions. This experiment was begun in the fall of 1905 and continued until the spring of 1909. The germination of the seeds was low during all the months, but in most instances was better for the samples stratified in sand than those kept in paper packages. The fluctuation in germination is believed to be due to factors that are not yet known.

In the case of studies made on the vitality of soft maple seed, it was found that these seed ordinarily soon lose their vitality but may be kept for a number of weeks in the refrigerator without losing their germinating power.

Relation of soil moisture to desert vegetation, B. E. LIVINGSTON (*Bot. Gaz., 50 (1910), No. 4, pp. 241–256, dgms. 4*).—In continuation of a previous report on the relation between vegetation and environmental conditions (E. S. R., 22, p. 325), the author presents data on the relation between soil moisture and desert vegetation. Studies were made of soils occurring on the hill where the Carnegie Desert Laboratory is situated, the plain below, and the slopes and wash, the water-holding power of each being determined.

During the driest months of the year the water-retaining capacity of the different samples was 22.7, 16.1, 15.5, and 8.4 per cent, respectively. Viewed from the general plant activities, the different soil types respond to their proportionate water-retaining capacities, the hill soil being first, followed by that of the plain, with the slope and wash soils in the order named.

The results of the study emphasize the importance of considering the water-holding power of soil in its relation to plant distribution.

The fundamental causes of succession among plant associations, H. C. COWLES (*Rpt. Brit. Assoc. Adv. Sci., 1909, pp. 668–670*).—The most important factors that contribute to changes in plant formations are held to be changes in the humus content of soils and an increase or decrease in the amount of shade. Other factors are plant invasions and topographical changes. Geological changes affect plant successions, but of necessity they are very slow in their action.

Mineral content of the leaves of fruit trees, L. RICHTER (*Landw. Vers. Stat.*, *73 (1910), No. 6, pp. 457–478*).—As a contribution to the autumn translocation of mineral materials the author gives the results of a study of the mineral content of the leaves of the apple, pear, cherry, and plum at different stages of growth, and of comparisons of the ash content of leaves and flower buds.

Comparing the leaf and flower buds of the cherry and plum, the water content of the flower buds was found to be higher than that of the leaf buds, while in the dry substance the flower buds were poorer in lime and phosphoric acid than the leaf buds. Nitrogen and potash were similarly distributed, although the differences were not so marked.

In regard to the autumn changes, samples of 100 leaves each of the different species were analyzed at intervals of about 3 weeks, covering the growing period. The proportion of nitrogen to total dry substance was found gradually to diminish from the period of its maximum, which varied in different species, until the last period, when the loss was quite marked. A similar translocation of phosphoric acid was noted. The potash content was almost constant, although it diminished considerably during the later stages of growth. The lime content increased until nearly the end of the growing period, when there was a similar falling off. The ash content of all leaves except the plum was fairly constant during the second stage of growth, but during the time that elapsed between the last two samplings there was a decided falling off.

The author claims there is a decided relation between the weather and translocation. If warm weather continues well into the autumn much of the mineral material of the leaves will be translocated, but if a sudden early fall in temperature occurs the leaves are liable to drop from the trees before translocation can be effected.

Amount of copper in tea sprayed with Bordeaux mixture, H. E. ANNETT and S. C. KAR (*Jour. Agr. Sci., 3 (1910), No. 3, pp. 314–316*).—Tests for the presence of copper in unsprayed tea and that sprayed with Bordeaux mixture showed that the unsprayed tea contained $\frac{1}{12}$ gr. per pound, while the sprayed tea contained $\frac{1}{2}$ gr. per pound. Tests were also made of the infusion from 36 gm. of sprayed tea leaves, and showed that if one drank as much as 8 cupfuls, only an inappreciable amount of copper (0.0002 gr.) would be taken into the system.

FIELD CROPS.

The electrification of crops, J. W. ROBERTSON (*Field [London], 116 (1910), Nos. 3012, p. 516; 3013, p. 622; 3014, p. 665; 3015, p. 709, figs. 13*).—In this series of articles the author has gathered together the results obtained in various countries in investigations of the influence of electricity upon growing crops.

J. E. Newman could discover no effect on strawberries at Evesham, but the entire field was abnormal and yielded 4 tons per acre of jam fruit. A wire run down the middle of a greenhouse and not more than 3 ft. from the strawberries apparently caused a marked improvement of the electrified fruit, the crop being sweeter though not heavier. Both English and German investigators are quoted as finding that electrification increases the sugar content of the sugar beet. Mr. Newman reports in his work with wheat that "the result last year was a difference between 30 and 36½ bu. per acre. In Scotland last year barley gave a small increase in the grain. . . . They have had a very dry season indeed in Scotland until a fortnight ago, and when I walked over the oats I could not see that there was any advantage gained by the electrified plats this season." The Scotch experiments were conducted at Balmakewan, Kincardineshire, where the electrified portions of the tests include 23 acres in approximately 4½-acre plats, each in one stage of a 5-year rotation.

The author presents a table of British results, secured with the use of high tension electricity from a coil and valves, except that the larger portion of the experiments at Bitton were with electricity from an influence machine. At Bitton, the yield of beans was decreased 15 per cent but their earliness was increased 5 days and that of cabbages 10 days. The yield and the earliness of cucumbers were increased. One-year old strawberry plants had their fruit production increased 80 per cent and sent out more runners. Five-year plants yielded 36 per cent increase. At Gloucester, beets showed a 33 per cent increase and carrots a 50 per cent increase in 1905. At Evesham, strawberries showed a 25 per cent increase in yield in 1907, a 9 per cent decrease in 1908, a 2 per cent decrease in 1909, and less than 1 per cent difference in 1910. The electrified plats of tomatoes produced more pounds of fruit per plant than the nonelectrified plat, while Red Fife and White Queen wheat were increased 39 and 29 per cent respectively in 1906 and Red Fife 29 per cent in 1907. In 1908 the increase of square head wheat at this point was 24.3 per cent, in 1909 that of Red Fife 23 per cent, and in 1906 there was a 5 per cent increase in barley yield but the crop was very irregular, probably because of irregularity in manuring. At Balmakewan, mangels showed an increase of 18 per cent, potatoes an increase in leafage but none in tubers, oats an increase of 6½ per cent in grain and 8 per cent in straw, and turnips only a small increase.

At Dumfries, Miss E. C. Dudgeon finds that onions show a marked difference, beets and carrots less. Potatoes show more leafage. This experiment is to be increased from 0.1 acre to a 6-acre field.

At Falkenrede, Germany, the results indicated in the following table have been obtained:

Relative yields in 1910 at Falkenrede.

Plat.	Rye.		Wheat.		Barley.		Oats.	
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
1	92.1	90.5	125.5	84.1	109.5	112.8	118.7	95.9
2	87.1	86.0	117.0	88.5	91.0	78.5	90.8	71.2
3	94.9	84.3	114.0	88.6	104.8	92.6	105.2	78.7
4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

The plats in this experiment ran north and south. Plats 1 and 2 were each 75 yds. wide and electrified, and the control plats 3 and 4 were each 37½ yds. wide, but "plat 3 is believed to have been more or less electrified."

At Halle no advantage was obtained from electrification although the equipment worked well. The plats are said to have been arranged in a chessboard pattern.

J. E. Newman is quoted as saying that "in a German experiment, chalk was scattered on the ground and it was found that the chalk under the wires contained more nitrogen than the chalk outside the wires. The discharge from our wires must add some nitrogen to the soil. Various analyses seem to show that the amount is not inconsiderable."

Report of the cooperative forage crop work by the United States Department of Agriculture and the Texas Experiment Station at Chillicothe, Tex., 1909, A. B. CONNOR (*Texas Sta. Bul. 132, pp. 7–35, figs. 19*).—Among 7 sorghums tested S. P. I. No. 19744 proved an excellent strain of pink Kafir corn and No. 19751, a tall, slender, sweet-stemmed, red strain, of probable value as a dual purpose sorghum. No. 21936 was a very drought-resistant, leafy-dwarf type, and 19775, tall, sweet-stemmed and entirely distinct from the remainder. Among 60 recent sorghum introductions, 39 failed to head and none made satisfactory growth, but 4 of unusual leafiness may be of value for hybridization and for soiling and ensilage purposes in the South. Of those that produced heads all were dry and lacking in sweetness, but Nos. 23361 and 24126 were drought resistant although otherwise not superior to the native red variety. Of 15 sorghums received late and planted May 21, all were killed by drought, while 8 pennisetums from Africa and India, planted the same day, were still less drought resistant, but Nos. 25343 and 24446 were most resistant.

Breeding work was taken up to increase leafiness, juiciness, sweetness, seed yield, and feeding value. Milo maize head rows varied from 11.8 to 13.8 in leafiness. Although the seasonal conditions and rate and date of seeding affected the leafiness, "the selections this season have shown no advancement," but progress is expected in future favorable seasons. Attempts to obtain cross-pollinated seeds from Fetertia and Black-hulled Kafir failed and in future the flowers will be washed in the hope of better results.

In close drilled seedings, Sumac excelled other sorghums in yield and 1 bu. per acre proved the optimum rate of seeding. Orange and Minnesota Amber planted from ½ to 1 in. apart in the drill produced the heaviest yields.

A test of 13 sorghum-legume mixtures indicates that Brabham and Iron cowpeas and *Dolichos biflorus* are the best legumes for this purpose and *D. biflorus* is most drought resistant. An Amber-Whip-poor-will mixture in the ratio of 1:7 produced the maximum yield of forage obtained with cowpeas, of 3,600 lbs., while an Amber-*D. biflorus* mixture yielded 4,400 lbs. per acre. It was found that mixtures yield best when sown in drills, but will not feed readily through the ordinary grain drill. The shock of the harvester sickle caused the leaves to fall from the cowpeas and pack very solidly under the lower elevator chains.

In a test of 5 varieties of cowpeas, Brabham produced the heaviest yield but was excelled by Iron in drought resistance, while Cream and Common Whip-poor-will were excelled by Chinese Whip-poor-will in yield, earliness, and drought resistance. Larger yields were secured from plantings of cowpeas in 18-in. rows than in 36-in. rows, but the reverse was true in plantings of Kulthi and Moth Beans. The latter excelled the former in yield per acre, but lacked drought resistance.

Among 12 varieties of peanuts the small Spanish and Tennessee Red excelled the remainder and proved about equal in the production of forage. Sowings of alfalfa gave negative results and seeding in rows proved less satisfactory than broadcast plantings. Millets planted in 36-in. rows and cultivated made promising growth in some cases. Of 18 foxtail millets the most promising was the Big German variety, 20694. Three Burmese varieties reached a height of 3 ft. but were late and a little coarse. None of 6 Proso or 4 Eleusine millets proved of value and the barnyard millets lacked drought resistance. Plantings of hairy vetch with oats, 8 miscellaneous legumes, *Chloris gayana*, Eragrostis, *Astreble triticoides*, *Andropogon leucopogon*, Laganaria, and Leguna corn gave negative results. *Sorghum halapense*, No. 25017, proved entirely devoid of root stocks, reached a height of 4½ ft., suckered about as native Johnson grass and was more seriously affected by drought, but recovered quickly after cutting even under drought conditions.

Rescue grass seeded in October produced a good crop of seed early in the spring. The plat was then plowed, planted to cowpeas, cultivated 3 times and in the latter part of October the grass seed which had shattered from the spring crop germinated spontaneously and produced a very thick stand.

Black-hulled Kafir corn proved best in the yield of forage and feeding value when planted from 2 to 4 in. apart in 36-in. rows. Planting milo maize at the same rate gives a high percentage of erect heads, while a 2-in. seeding ordinarily gives 100 per cent of erect heads, except at the ends of plats where moisture is abundant. Thinner seeding results in goose-necked plants. The thick seeding reduced the leafiness of the individual milo maize plants. The rates of leafiness ranged from 8.6 for 6-in. sowings to 10 for 16-in. sowings. Sowings between April 15 and May 1 gave the best yields of forage and seed, while seedings June 15 or later are undesirable for all varieties.

[Variety tests of grains and alfalfa], C. WILLIS (*South Dakota Sta. Rpt. 1910, pp. 16–23*).—Among 15 varieties of corn tested Early Tuscarora produced the highest yield, 31.9 bu. per acre. A table states the source of seed, number of ears per 100 lbs., shelling and germination percentages, and pounds per bushel of grain obtained from each variety.

A brief history and progress report of work with 6,500 alfalfa plants grown from seeds secured from Siberia is also given. The following table shows the results obtained with the highest-yielding small grains:

Some results of variety tests with cereals in 1909.

Grain.	Varieties in test.		Leading varieties.	Yield.	Resistance.		
	Number.	Average yield.			Smut.	Rust.	
						Stem.	Leaf.
		Bush.		*Bush.*	*Per ct.*	*Per ct.*	*Per ct.*
Oats	17	31.60	Sixty Day	58.1	100	25	50
			Swedish Select	44.0	100	40	50
Wheat	10	17.15	Red Fife	21.8	100	60	50
			Velvet Chaff	23.8	99	85	65
Barley	11	19.08	Minnesota	36.9	100	90	70
			Odessa	26.3	100	90	85
Durum wheat	9	15.60	Arnautka	19.0	100	90	95

Agronomy and seed division, E. J. MACMILLAN (*Dept. Agr. Orange River Colony, Ann. Rpt., 5 (1908–9), pp. 63–71*).—Alfalfa sown broadcast produced 3 cuttings per year with a total dry weight per acre of 4,990 lbs. When sown in drills, from 9 to 18 in. apart, the yields ranged from 3,550 to 4,850 lbs., but when sown in drills 24, 30, and 36 in. apart, 4 cuttings per year produced yields per acre of 5,300, 7,350, and 9,150 lbs. per acre, respectively. "In growing lucern on dry lands the drill system with cultivation is best."

Efforts to obtain a field crop of sainfoin have failed, but a small plat yielded 3 cuttings aggregating 8,850 lbs. of green crop per acre. "The seed should be sown in the later part of March at the rate of 20 lbs. per acre."

Six acres of burnet, sown January 31, afforded good winter pasturage June 30. Broadcast seeding produced fair results but was excelled by seeding in 18 in. rows. Three cuttings aggregated 1,050 lbs. of green crop per acre. "Burnet is one of the best perennial plants under trial for the production of winter pasturage."

In a variety test of millet, Munga (pearl) and Golden yielded 4.37 and 2.11 tons respectively of dry hay per acre. *Paspalum dilatatum* proved a persistent grower and was drought but not frost resistant. Its hay yield was 1,050 lbs. per acre. Johnson grass proved drought resistant, while Teff grass yielded

3,100 lbs. of hay per acre 7 weeks from the date of seeding, and *Eragrostis superba* in 2 cuttings yielded a total of 5,700 lbs. per acre. "The frost cuts it down in early winter." *Phalaris commutata* appeared frost resistant and a strong grower.

The Up-to-date, Carmen No. 1, and Grootvlei Gem potatoes yielded 98.34, 62.48, and 62.21 bu. per acre respectively. Yellow Cango and Brazilian White corn produced the highest yields.

Variety test of cotton and corn, 1910 (*Georgia Sta. Circ. 66, pp. 2*).—Among 33 varieties of cotton tested McElhanny Cleveland and J. R. Cleveland Improved yielded 2,256 and 2,206 lbs. of seed cotton per acre respectively. Covington-Toole, Layton Improved, and Wannamaker Cleveland had lint percentages of 38.6 or more. Among 15 varieties of corn averaging 31.74 bu. per acre, Wannamaker Marlboro and Sander Improved yielded 36.15 and 36 bu. per acre, respectively.

Barley culture in the Southern States, H. B. Derr (*U. S. Dept. Agr., Farmers' Bul. 427, pp. 16, figs. 6*).—Discussions of the varieties of barley grown in the South and the soils, fertilizers, and green manures adapted to the crop are followed by directions for the preparation of the soil, sowing, fertilizing, harvesting, thrashing, and the prevention of attacks of diseases and insects, and data as to the uses of the crop and the opinion of Southern seedsmen and farmers regarding it.

The greater portion of nearly 200 varieties and selections of two and six-rowed bearded and hull-less varieties failed to mature grain on the Arlington Experimental Farm. Spring hooded barley sown broadcast in Tennessee on river bottom land, February 1, at the rate of 1½ bu. per acre ripened May 15 and yielded 40 bu. per acre. The test of two and six-rowed spring and six-rowed winter barleys previously noted (E. S. R., 6, p. 539) is also summarized.

On clay soil, cowpeas and rye plowed under as green manures in addition to barnyard manure and 200 lbs. of acid phosphate per acre have given excellent yields with wheat, barley, and oats. At the North Carolina Station, sowing December 6 has resulted in higher yields than at any earlier date, but at the Tennessee Station sowing September 17 has been followed by higher yields than sowings made on any of six later dates. At the Maryland Station and the Arlington Farm, seeding October 1 has proved too late for the best results. Data from the time-of-seeding test at the Virginia Station have already been noted (E. S. R., 20, p. 932).

A new awnless barley, H. B. Derr (*Science, n. ser., 32 (1910), No. 823, pp. 473, 474, fig. 1*).—A true beardless or awnless barley has been produced by selection among hydrids resulting from the crossing of Tennessee Winter and white six-rowed barley (*Hordeum vulgare*), and Black Arabian, a two-rowed variety (*H. distichum*).

In the third generation a form occurred in which the awns on the median spikelets were from 3 to 4 in. long, while grains with short awns appeared in some lateral spikelets. The short-awned rudimentary grains produced heads like those from which they were secured, except that on one plant most of the lateral spikelets contained perfect short-awned kernels. From these short-awned kernels was secured a plant which "contained heads upon which all of the spikelets were fertile, the heads being 6-rowed, with large plump grains without awns. . . . Of the several hundred heads produced in 1910, 99 per cent were of the awnless type."

The progressive reduction of the awns and a persistence of the awnless condition for 2 seasons, lead the author to believe that the type is fixed. He proposes the name "hooded" barley for that which was formerly called "beardless," and the restriction of the term "beardless" to the new hybrid.

Clover in the Palouse country, G. SEVERANCE (*Washington Sta. Popular Bul. 31, pp. 4*).—The comparative value of alfalfa and red clover in the Palouse country is briefly discussed.

During the years 1895 to 1909, sowings of from 1 to 25 acres were made at the station. Since 1904, the yields have ranged from 2.35 to 3.9 tons per acre with no failure except that one good stand was spoiled by ground squirrels and wild oats. Prior to 1904 failures were experienced and the highest yield obtained was 1.77 tons per acre.

After tests of red, mammoth, alsike, white, crimson, berseem, burr, and Japan clovers, the author recommends red clovers for this region or alsike in case of wheat lands. Two years' trials of fall seeding proved failures. April seeding in 1909 produced the unusually favorable yield of 0.66 ton of hay per acre the first season.

Other topics popularly treated are seed selection, soil preparation, method of seeding, nurse crops, and protection from squirrels.

[Report of work with cotton on the Iredell Test Farm in 1903–1909], B. W. KILGORE ET AL. (*Bul. N. C. Dept. Agr., 31 (1910), No. 8, pp. 65*).—This bulletin contains two studies.

I. *Fertilizer experiments with cotton on Piedmont red clay loam soil.*—This portion of the bulletin reports the fertilizer experiments with cotton conducted on the Iredell Test Farm during the period 1903–1909. Nitrogen alone was used at a loss. Potash alone gave a small increase in profits but proved more effective than potash and nitrogen combined. Phosphoric acid alone produced good profits in all cases but these profits were not increased by the addition of nitrogen to phosphoric acid. The addition of potash to phosphoric acid proved profitable. The combination of the three yielded larger returns than any one, but two-thirds of the increase appeared to result from the phosphoric acid. Lime appeared to decrease the yield when applied with a complete fertilizer, but when used alone yielded a small profit and gave good returns on a plat where peas had been grown for 4 years.

The application of 400 lbs. per acre of a fertilizer supplying 10 lbs. each of nitrogen and potash and 28 lbs. of phosphoric acid was regarded as normal. A larger profit arose from the use of half this amount of nitrogen, but variations in the amounts of potash and phosphoric acid from this normal failed to increase the profits. When 200, 400, 600, 800, and 1,000 lbs. per acre were applied to different plats the net profits per 100 lbs. of normal fertilizer were $8, $6.70, $5.38, $4.23, and $3.69 respectively.

Tests of dried blood and nitrate of soda gave no distinctive advantage to either. The most profitable method of applying either these nitrogen sources or complete fertilizers was their distribution in the drill before planting. Another method tested was broadcasting before planting, one-half in the drill before planting and the other half as a side dressing about July 1.

II. *Varieties, culture, and fertilization of cotton on Piedmont red clay loam, red clay and valley soils.*—The author gives directions for the preparation of the soil and the cultivation and fertilization of the crop, and discusses a 7 year's test of 60 varieties of cotton. Some results secured during one year of this test have already been noted (E. S. R., 23, p. 38). Among the varieties that have done well are King, Simpkins, Sugar Loaf, Williams, Edgeworth, Webb, Hodge, Shine Extra Early, and Dozier.

Cultivation of guinea grass, D. L. NARAYAN RAO (*Agr. Jour. India, 5 (1910), No. 4, pp. 362–366*).—The author reviews a part of the literature on guinea grass and states his experience on sandy or gravelly loam plats that have been producing the grass for 16 years. They were first planted 1½ ft. apart each way, and during the first year yielded 4 tons of grass per acre. During the 5 succeeding years the annual yield ranged from 25 to 100 tons per acre. The author summarizes his experience and ventures to assert that "there is no other plant, wild or cultivated, that yields 100 tons per acre of green stuff every year for a generation."

A new fodder plant, E. G. KENNY (*Rhodesia Agr. Jour., 7 (1910), No. 5, pp. 1398–1400, fig. 1*).—The author suggests the name of Napier's fodder (*Pennisetum* sp.) for a plant resembling pearl millet (*P. typhoideum*). He describes the plant, pronounces it very drought and frost resistant, and gives this analysis: Water 55.33, ether extract 0.84, protein 3.10, carbohydrates 21.16, fiber 15.66, and ash 3.71 per cent. The plant is adapted to light dry soil and propagated by subdivision of the roots and by cuttings or slips.

Cloth made from seaweed, H. D. BAKER (*Daily Cons. and Trade Rpts. [U. S.], 13 (1910), No. 125, p. 790*).—*Posidonia australia*, a submarine plant, yields fiber which is not inflammable except at a very high temperature. It is suitable for bedding, upholstering, rope, string, mats, the packing of fruit and eggs, paper making, and other purposes. Its fibers are larger and finer than those of *P. oceanica*, and when mixed with wool appear "to weave into an excellent cloth which may be dyed various colors." As a seaweed it grows on a limestone bottom and is found in large deposits from 4 to 20 ft. in thickness along the southern coast of Australia. Experiments indicate that the deposits contain but 1 per cent of the pure fiber, the remainder being sand, shells, and débris.

Experimental work, 1909, F. CHARLAN (*Canada Dept. Agr., Tobacco Div. Bul. A8, pp. 24, pls. 9*).—This bulletin consists of 3 parts.

I. *Experiments in the growing of seed plants.*—The experiments reported verify conclusions already noted (E. S. R., 22, p. 337). In the later germination tests it appeared that light had a considerable influence on the results and that a higher proportion of seedlings may be expected from dry seeds germinated before sowing. The objection to artificial germination is the weakening effect produced on the germ by carrying on the work in the dark.

II. *Sterilization of soils. Seed tests. Thickness of seeding.*—Steam sterilization of the soil in beds to be used for tobacco seedlings retarded the growth of the seedlings, and formalin treatment proved preferable. Although the plants started slowly after it, they rapidly overtook the plants in the untreated bed and were the first ready for setting out. Formalin treatment does not destroy the weed seeds and for this purpose steam is more effective. A solution of 2½, or, in doubtful cases, of 5 lbs. of formalin in 50 gal. of water is suggested. The stronger solution may delay germination and early growth.

Best results were obtained with seeds from 2 to 6 years old which is perfectly formed and is unimpaired in vitality. Seed 10 or more years old may give excellent results but lapse of time causes partial loss of vitality. The author suggests that the tobacco grower should cellect seeds in the most favorable year and keep them available for 5 to 6 years.

A good stand was secured by sowing ⅐ oz. of seed with a germination test of 90 per cent on 100 sq. ft. Axillary capsules gave slightly earlier but less vigorous plants, which yielded 1,161 lbs. per acre as compared with 1,591 lbs. from seeds out of other capsules. Late or imperfectly formed capsules should not be harvested.

III. *The value to Canadian farmers of home-grown tobacco seed.*—In a variety test Wisconsin Special produced 1,163 lbs. per acre as compared with 1,241 lbs. from Canadian Wisconsin. Imported and Canadian grown Comstock Spanish seed yielded 1,101 and 1,471 lbs. per acre respectively.

Report of the tobacco expert, L. M. STELLA (*Rpt. Dept. Agr. Cape Good Hope, 1909, pp. 120–126, pls. 2*).—The highest yield of tobacco, valued at £32 6s. per

per acre was secured after an application of 4½ tons of kraal manure per acre, but the crop was coarse in texture and bitter. The leaf secured after an application of 200 lbs. of nitrate of soda, 220 lbs. of superphosphate, and 160 lbs. of sulphate of potash was valued at only £14 16s. per acre, but was mild, sweet, and pleasant and considered the "most hopeful of samples."

Plats on which vaporite was sown in the hope of preventing loss from pests suffered greater damage in 2 cases than the checks. The cost per acre of growing Turkish tobacco is estimated at £15 including rent, cultivation, fertilization, picking, handling, priming, and warming.

The management of tobacco seed beds, W. M. Hinson and E. H. Jenkins (*Connecticut State Sta. Bul. 166, pp. 3–11, fig. 1*).—This bulletin reports the results of work in cooperation with the Bureau of Plant Industry of this Department. It discusses the advantage of sterilizing tobacco seed beds, the use of fertilizers, and the apparatus for and the operation of steam sterilizing.

A pressure of 70 lbs. maintained for 30 minutes sufficed to kill all seeds. The labor cost of sterilizing 180 sq. yds. of seed beds was $6, while that of weeding 90 sq. yds. of unsterilized beds until the seedlings were pulled was $12. Steam sterilization is more convenient if a boiler is at hand, and more effective in killing weed seed. On a small scale the formalin treatment may be more feasible and is best applied to a dry soil in the fall.

It is stated that "the calico disease can be carried in the stems of the plants infected with it," or in tobacco water prepared for them, but that no evidence has been obtained to show that infection arises from stems plowed into the soil. The fact that alternate plants in the row may be "calicoed" may be accounted for if only one of the two workmen has handled a diseased plant.

Other topics discussed are the rate of seeding, use of sprouted and dry seed, and the watering and ventilation of seed beds.

The burning quality of tobacco, with suggestions for its improvement in the flue-cured types of eastern North Carolina and South Carolina, E. H. Mathewson (*U. S. Dept. Agr., Bur. Plant. Indus. Doc. 629, pp. 4*).—Complaints of the defective burning quality of certain new belt types from North and South Carolina are thought to arise from the lack of sufficient potash in the soils on which they are grown. The use of certain formulas supplying this fertilizer is suggested.

Distribution of seeds and plants, E. J. Wickson and R. E. Mansell (*California Sta. Seed Bul. 1910–11, pp. 4*).—This bulletin gives data as to the seed distribution of the California Station from 1903 to 1910, and describes the varieties of flower and vegetable seeds now on hand for distribution.

Agricultural seeds and their weed impurities: A source of Ireland's alien flora, T. Johnson and Miss R. Hensman (*Sci. Proc. Roy. Dublin Soc., n. ser., 12 (1910), No. 33, pp. 446–462, pls. 2*).—The authors present in parallel columns the results of their own investigations and those of the Zürich Station and 21 different German stations. The object of the paper is to show "from what particular agricultural seed and region the alien weed comes, and also to indicate how the alien flora of Ireland is being added to from the agricultural seeds sown." A reference list of 5 titles is given.

Report of the seed tester, S. Treleaven (*Rpt. Dept. Agr. Cape Good Hope, 1909, pp. 116–119*).—These pages report the results of germination tests of tall fescue, alfalfa, and tobacco seed, and purity tests of alfalfa and oat seeds. Lists are also given of the useful forage plants, weeds, poisonous plants, and medicinal plants submitted for identification.

Cuscuta obtusiflora breviflora, A. I. Mal'tsev (*Trudui Byuro Prikl. Bot., 3 (1910), No. 8, pp. 289–308, pl. 1, figs. 2*).—The author reports the occurrence of this dodder on a species of pepper (*Capsicum longum*) in Astrakhan.

The error of experiment in agricultural field trials, A. D. HALL and E. J. RUSSELL (*Chem. News, 102 (1910), No. 2654, p. 180; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 20, p. 1218*).—In analyzing the causes of error the authors classify them under lack of uniformity of soil, lack of uniformity in conditions of growth, and effect of season, and estimate the total magnitude of the error of experiment at Rothamsted as 10 per cent. They would not generally "lay stress on differences of less than 15 per cent."

Plant breeding, A. H. COCKAYNE (*Jour. New Zeal. Dept. Agr., 1 (1910), No. 4, pp. 234–241*).—This article very briefly summarizes the plant breeding work of the world on cereals, fruits, vegetables, sugar beets, root crops, and forage plants, and suggests lines of investigations for New Zealand.

HORTICULTURE.

The California vegetables in garden and field, E. J. WICKSON (*San Francisco, 1910, 2. ed., rev. and enl., pp. 367, pl. 1, figs. 20*).—Although this work deals primarily with vegetable growing in California, it is offered as a manual of practice with and without irrigation for semitropical countries.

The Lamao Experiment Station, O. B. BURREL (*Philippine Agr. Rev. [English Ed.], 3 (1910), No. 10, pp. 581–586, pls. 2*).—A description of the work of this station, which has been confined chiefly to the testing of vegetables and the growing of nursery stock, fruits, and other plants for distribution. More recent lines of work taken up are the selection and breeding of native vegetables and fruits. Short descriptive and cultural notes are given of a number of native vegetables of special value for general use.

Wild ginseng in Manchuria, M. TOMIIYE and T. YOSHIDA (*Spec. Crops, n. ser., 9 (1910), No. 100, pp. 471–474*).—An account of wild ginseng in Manchuria relative to its history, distribution, and habitat, gathering, preparation, marketing, etc.

The influence of the hygrometric condition on the growth of mushrooms, M. PONROY (*Separate from Bul. Soc. Mycol. France, 26 (1910), No. 3, pp. 9, map 1*).—A discussion of conditions of temperature and humidity suitable for the development of mycelium and of fruit. The author attributes numerous failures and poor success in mushroom culture to neglect to regulate atmospheric conditions in conformity, as far as possible, with such as favor the development of mushrooms in the open air.

Parthenogenesis among gooseberries, EWERT (*Landw. Jahrb., 39 (1910), No. 3, pp. 463–470, pls. 2*).—In continuation of the author's previous studies of parthenogenetic fruit (E. S. R., 22, p. 639), two varieties of gooseberries were studied to determine whether fruit could be produced by decorticating or ringing the branches in the absence of pollination, which was mechanically prevented (E. S. R., 19, p. 142). Seedless fruit was successfully produced in this way.

The seedless fruit was somewhat smaller and matured about 14 days earlier than the seeded fruit of the check plants.

Studies of the anatomy and chemical composition of the seedless fruit showed that, contrary to the results secured by Müller-Thurgau in his work with grapes (E. S. R., 11, p. 932), the cells in the fruit pulp were much larger and the fruit walls much thicker in the seedless than in the seeded fruit. The enlargement was principally in the portion between the vascular bundles and the endocarp. Furthermore, chemical analysis showed the seedless fruit to contain a higher sugar and acid content than the seeded fruit when both kinds were fully ripe. There was a weaker development of vascular bundles in the seedless fruits.

Müller-Thurgau's results are believed to have been influenced by the competitive struggle of seeded grapes with seedless grapes growing on the same vine or bunch. This phase is further discussed in the work with pears noted below.

The correlative influences of seed on the ripening process of fruits, EWERT (*Landw. Jahrb., 39 (1910), No. 3, pp. 471–486*).—In continuation of previous investigations (E. S. R., 22, p. 639), analyses of the fruits of a number of varieties of pears and one variety of apple made in 1909 are reported with special reference to the influence of seeds on the total sugar and acid content of the fruit. In a number of instances, tests were also made for starch. The data are fully discussed.

With most of the varieties, very little starch was found in either the seeded or seedless fruits. When starch was present, it disappeared in both the seeded and seedless pears at the same period before maturity. In general the seedless fruit ripened first, though there was only a few days difference in this respect and the ripening period of individual varieties was not materially influenced by the presence or absence of seed. Cane sugar was rarely present in ripe pears and exerted no influence on the total sugar content relations.

Generally speaking, with seeded and seedless fruits taken from the same tree, the seeded fruits were richer in sugar and also richer in acid. The seedless fruits, however, which were taken from trees possessing strong parthenogenetic tendencies and upon which fertilization had been artificially prevented (E. S. R., 19, p. 142), were richer in sugar and lower in acid than seeded fruits of the same variety. An exception to this rule in the case of a strongly acid variety indicates that the tendency to produce less acid in parthenogenetic fruits may be outweighed by the varietal characteristic. In so far as seedless fruits come into competition with seeded fruits on the same tree, the author concludes that the seeded fruits make the storing up of sugar in the seedless fruits difficult.

Aside from the fact that the greater number of seeds creates in many cases a slower maturity of the fruit, it is believed that the seeds also exert an important influence upon the metabolism processes in the fruit with special reference to the development of vascular bundles and upon the protein metabolism. This phase is discussed to some extent, although no conclusions are formed in the light of the present investigations. The importance, however, of taking the mutual relations of fruits into consideration when studying the nutritive processes of fruits is pointed out.

The blossoming of apple trees, DUKE OF BEDFORD and S. U. PICKERING (*Woburn Expt. Fruit Farm Rpt., 12 (1910), pp. 35–51*).—In a search for factors governing the blossoming order of different varieties of apples, trees of 117 varieties of English apples and 67 varieties of Scotch and foreign apples were observed at the Woburn Experimental Fruit Farm during the seasons 1905 to 1909, inclusive.

The combined results of the 5 seasons' work showed that apples which ripened early usually blossomed 2 or 3 days earlier on the average than late varieties. The character of the fruit, with reference to its use for dessert or cooking, had no effect on the relative date of blossoming. The duration of the blossoming period of a number of different varieties in any particular year was influenced largely by the prevailing weather conditions, rather than by the actual date on which the earliest variety blossomed. Likewise the tendency of certain varieties to blossom habitually earlier or later than others exerted only about one-third as much influence in determining the order of blossoming as the prevailing weather conditions. The same variety occupied a place with reference to the order of blossoming averaging 2½ days difference in one season from what it occupied in another, whereas 2 different varieties selected at random occupied in the same year positions averaging $3\frac{1}{2}$ days difference from those of another year. There was, however, a certain tendency to preserve the same order of flowering in successive seasons. Varieties of apples of foreign origin showed no peculiarities in the date of their blossoming.

The Hitchings apple, S. A. Beach (*Rural New Yorker, 69 (1910), No. 4073, p. 1069, figs. 2*).—A new sport of the Twenty-Ounce apple originating in the Hitchings' orchard, near Syracuse, is here pictured and described. This variety, which has been called the Hitchings, is of the same texture, flavor, and quality, as the Twenty Ounce, but is about 2 weeks later in season and has a red, unbroken color, which in the best specimens, practically covers the entire fruit.

Some modern viticultural methods, G. H. Adcock (*Rpt. Austral. Assoc. Adv. Sci., 12 (1909), pp. 606–612*).—This is a résumé of the progress made in the State of Victoria with the reconstitution of phylloxera infested vineyards on American resistant stocks.

Pollination experiments with Anonas, P. J. Wester (*Bul. Torrey Bot. Club, 37 (1910), No. 2, pp. 529–539, figs. 5*).—Of the members of the Anona family which have been introduced into south Florida the sugar apple (*A. squamosa*), the custard apple (*A. reticulata*), and the cherimoya (*A. cherimolia*), together with one indigenous species, the pond apple (*A. glabra*) appear to grow well, but the failure of the cherimoya to set fruit after having bloomed for several years led the author to begin investigations in 1907 relative to the probable cause of the sterility of this species in Florida.

Pollination studies of the flowers of all of the above species during the past 4 seasons led the author to conclude that the flowers are proterogynous and entomophilous. A small beetle (*Colastus truncatus*) was found acting as pollinating agent in the flowers of the sugar apple and cherimoya. Two other beetles (*Triphleps insidiosus?*) and a small, brownish beetle, identified as belonging to the group Pharaxonothi, were also present in the flowers. In addition a small thrips frequents the flowers and probably to some extent assists in their pollination.

In the experiments to verify the theory of proterogyny, fruit failed to set where the pollen was applied to the stigma simultaneously with the discharge of its own pollen. Applications of pollen made from 15 to 48 hours previous to the discharge of self pollen, however, led to the setting of considerable fruit.

The author concludes that the sterility of the cherimoya in Florida has been due to the scarcity of blooms, which are only one-third of the number on the sugar apple, as well as to an insufficient number of insects to assist in the pollination of the flowers. As the cherimoya trees increased with age and produced more flowers during the course of the investigation, they have set fruit sparingly without artificial pollination and at less than 20 ft. above tide water. Fruit of this species is also set at low altitudes in California and southern France but in Hawaii it fruits only at an elevation of many hundred feet above sea level. It is suggested that this may be due to the absence of certain pollinating insects at lower altitudes in Hawaii.

The sugar apple has been found to hybridize readily with the cherimoya, custard, and pond apples and the cherimoya has been successfully crossed with the pond apple. Attempts to cross the soursop (*A. muricata*) with the cherimoya, sugar apple, and custard apple have failed. It is suggested that the extraordinary productivity of a few individual Anona trees may be due to a change in regard to the pollination of the flowers of these trees, such as synacmy and self-pollination. The value of such trees for breeding work in case this hypothesis should be confirmed is pointed out.

A monœcious date, D. Bois (*Rev. Hort. [Paris], 82 (1910), No. 21, pp. 492–494, fig. 1*).—The author here describes and illustrates the infloresence of a date palm received from C. Henry, gardener-in-chief of the Khédive, Cairo, Egypt, which is monœcious in character, whereas the date palm has generally been considered as diœcious. Some of the inflorescences on this tree consist entirely of either male or female flowers and others are mixed, the female flowers being situated at the base of the spadices and the male flowers at the summit. The extremities dry up after fecundation and the fall of the staminate flowers.

The relation of asexual or bud mutation to the decadence of California citrus orchards, J. E. Coit (*Proc. [Cal.] Fruit Growers' Conv., 37 (1910), pp. 32–39*).—A paper on this subject, with the discussion following, in which the author presents the idea that a part of the decadence in the citrus orchards is due to divergence of fortuitous bud-mutations. It is further suggested that these mutations may be retrogressive and if not checked by intelligent pruning and bud selection may cause the fruits to become a mixture of bad types. The importance of rebudding trees with desirable sports arising from progressive mutations is pointed out.

The citrus grove, its location and cultivation, P. H. Rolfs (*Fla. Quart. Bul. Dept. Agr., 20 (1910), No. 2, pp. 81–96*).—A popular account of citrus culture with special reference to Florida conditions.

Orchard heating, R. F. Howard (*Bul. Nebr. State Hort. Soc. No. 32, 1910, pp. 10, figs. 2*).—This paper discusses frost protection from the standpoint of Nebraska conditions. A test was made of the sliding lid type of oil heaters in the Nebraska Experiment Station orchard in the spring of 1910. Two acres were heated, 60 heaters per acre being employed, and the temperature was kept up from 3° to 4° higher than that outside against a prevailing 20-mile wind.

Frost prevention work in the Rogue River Valley, Oreg., during the spring of 1910, P. J. O'Gara (*Mo. Weather Rev., 38 (1910), No. 9, pp. 1437–1440*).—This article shows that the results obtained with fires and smudges to prevent frost injury to orchards in 1910 confirm those obtained in 1909 (E. S. R., 23, p. 441). In view of the uniform success both in forecasting and in preventing injury the author is of the opinion that the problem of protection of orchards from frost injury in Rogue River Valley has been settled.

Kinds of fruit to plant in different districts, W. S. Thornber (*Better Fruit, 5 (1910), No. 6, p. 42*).—Lists are given of varieties of orchard and small fruits and nuts recommended for planting in the coastal slope region, inland valleys, and upland valleys in Washington State.

FORESTRY.

The forest resources of the world, R. Zon (*U. S. Dept. Agr., Forest Serv. Bul. 83, pp. 91*).—This bulletin presents a statistical study of the forest resources of the principal timber-producing countries of the world with special reference to the influence of foreign resources upon the forest resources and future supply in the United States. The topics discussed for each country are as follows: Forest area, distribution of the forests throughout the country, composition and character of the forests, annual consumption, cutting, growth per acre, and wood prices. Except for slight modifications the subject matter is similar to that presented in the author's report to the National Conservation Commission on Foreign Sources of Timber Supply (E. S. R., 23, p. 43).

Second annual report of state forester on the progress of forestry in Vermont, A. F. Hawes (*Ann. Rpt. State Forester Vt., 2 (1910), pp. 52, pls. 5,* *map 1*).—A progress report on state and private forest operations in Vermont. It contains a statement of forest educational work, including lectures, exhibits, publications, and assistance to private owners, private planting operations, and work in the state forest nursery, a brief discussion of forest administration in various countries, detailed reports on the lumber industries of Caledonia, Chittenden, and Addison Counties, Vt., and a report of forest fires for 1909, together with conclusions and recommendations regarding forest fires.

On July 1, 1910, there were some 2,073,000 trees of different species in the state nurseries. During the spring of 1910, 376,700 trees were sold to private parties as compared with 195,500 trees in 1909. White pine was the principal species planted, although some Norway spruce, Scotch pine, locust, and a few red pine trees were purchased.

The white pine blister rust (*Peridermium strobi*) was found on a number of imported seedlings. Measures are under way, however, to eradicate all infested stock and it is believed that the disease will be entirely stamped out by the spring of 1911.

Report of the superintendent of forestry, R. H. CAMPBELL ET AL. (*Rpt. Supt. Forestry Canada, 1910, pp. 77, pls. 12*).—A general report of the work of the forestry and irrigation branch of the Canadian Department of the Interior for the year 1909–10, together with the reports of the officials in charge of the different divisions of the work.

[Report on] silviculture (*Ann. Escola Polytech. São Paulo, 10* (*1910*), *pp. 129–135, pls. 6*).—A report on a number of species of timber trees which have been under observation at the experiment station of the São Paulo Polytechnic School for the past 5 years.

Contribution to the knowledge of trees of Argentina, S. VENTURI and M. LILLO (*Contribución al Conocimiento de los Arboles de la Argentina. Buenos Aires, 1910, pp. VI+127*).—This consists of determinations by M. Lillo of some 371 timber species of Argentina, based upon collections and observations made by S. Venturi in behalf of the Argentina Centennial Expositon of 1910. The genera and the species are arranged in alphabetical order, and the data given for each species include the provincial name, previous references, habitat, average circumference of trees observed, and economic value of the wood.

A number of new species were named by Lillo, including *Blepharocalyx giganteus*, *B. montanus*, *Ilex argentina*, *Prunus tucumanensis*, *Gyrotænia* (?) *argentina*, *Lonchocarpus sylvaticus*, and *Bauhinia venturii*.

Report on the introduction of exotic species in Belgium, A. VISART and C. BOMMER (*Rapport sur l'Introduction des Essences Exotiques en Belgique. Brussels: Govt., 1909, pp. 381, pls. 6*).—This report embraces the salient features of an investigation, commenced in 1900 under the direction of the Belgian Superior Council of Forests at the suggestion of the Minister of Agriculture, to determine the results which have been secured during the past in acclimating exotic species of trees in Belgium, and to secure information relative to additional species of possible value in developing forestry in various parts of that country. In arriving at the value of the various species, the experience gained in neighboring countries has also been drawn on.

Consideration is first given to the climate of Belgium, after which the various deciduous and coniferous trees which have either been grown in Belgium or are recommended for trial are considered in detail, relative to their characteristics, economic value, and origin. The appraisement of the various species is summarized and a number of conclusions are drawn from the investigations as a whole. A bibliography is appended.

Thus far the exotic species having great importance in Belgium and which are all of either European or North American origin, are *Populus canadensis*, *Quercus rubra, Robinia pseudacacia, Juglans nigra, Picea excelsa, Larix europæa, Pinus laricio, P. laricio austriaca, P. strobus, Pseudotsuga douglasii,* and *Abies pectinata.*

Some West African timbers (*Bul. Imp. Inst.* [*So. Kensington*], *8* (*1910*), *No. 3, pp. 231–245*).—Samples of wood of a number of different timbers from the Gold Coast Colony, Northern Nigeria, and Gambia are reported on relative to their distinguishing characteristics, working qualities, and the purposes to which they can be applied. A majority of the woods are considered of more value for local use than for export.

On the variation of growth among forest trees with special reference to the so-called spreading faculty, L. A. HAUCH (*Forstw. Centbl., n. ser., 32* (*1910*), *No. 11, pp. 565–578, pls. 6, dgm. 1*).—The author defines the "spreading faculty" (Ausbreitungsvermögens), which he considers as hereditary, as the faculty of a given tree species to develop, out of a certain number of plants grown under the same environment and cultural treatment, a greater or smaller number of individuals of the first or middle size classes. The smaller the number of trees in the larger size classes, the greater the spreading faculty of the species.

The importance of considering the spreading faculty of a species in connection with its cultural treatment is discussed at length. The evidence secured from beech and oak stands in the Bregenzer Wald region tends to show that the great spreading faculty of these species can be best regulated so as to produce the most uniform stand of trees by starting the cultural area with a dense plant cover, and following this up by early, frequent, and light thinnings rather than by severe thinnings at long intervals.

Although the cause of the beneficial action of a dense stand of seedlings or plants in promoting uniformity of growth is difficult to determine, the author suggests a possible greater bacterial activity under the dense cover. In lieu of this hypothesis it is suggested that the greater number of plants in the initial stand may include a greater number of individuals possessing desired characteristics in form and size. Portions of Johannsen's statistical study of variation (E. S. R., 21, p. 771) are cited in support of the latter theory.

The algaroba in Hawaii, E. V. WILCOX (*Hawaii Sta. Press Bul. 26, pp. 8*).—A brief account of the algaroba (*Prosopis juliflora*) relative to its introduction into Hawaii, botany, habits, and uses with special reference to the use of algaroba beans as stock feed.

Utilization of California eucalypts, H. S. BETTS and C. S. SMITH (*U. S. Dept. Agr., Forest Serv. Circ. 179, pp. 30, figs. 7*).—This circular gives in condensed form the results of mechanical tests conducted in cooperation with the University of California of 5 of the more common species of eucalypts being grown in that State. The status of other unfinished experiments in seasoning, together with some information in regard to the uses of eucalyptus wood in California and Australia, are also considered.

The results of the tests thus far made show that the strength of the same species grown in different localities or of different trees cut in the same locality may vary considerably. Sugar gum (*Eucalyptus corynocalyx*) which gave the highest strength values, together with blue gum (*E. globulus*) and red gum (*E. rostrata*), compare favorably in strength with white oak, pignut, and shagbark hickory, while gray gum (*E. tereticornis*) and manna gum (*E. viminalis*) rank with the weaker varieties of hickory. Sufficient data have not been secured to compare the toughness of eucalypts with that of hickory.

It is pointed out that in wood from trees as young as the California growers generally count on cutting, the tendency to warp, shrink, and check in drying is much stronger than in wood from mature forest-grown trees in Australia and

Tasmania. The shrinkage tests on blue gum showed an average shrinkage in volume of 21.8 per cent when dried from a green to an oven-dry condition as compared with an average of about 18 per cent for eastern red oak. Seasoning experiments based partly upon Australian practice are being conducted to determine the best methods of handling California grown eucalypts.

What are the causes of the serious failure of natural regeneration of old spruce stands on high situations and how can this unfavorable condition be overcome? How are such stands to be treated in the future? B. BAVIER (*Schweiz. Ztschr. Forstw., 61 (1910), Nos. 5, pp. 145–152; 6–7, pp. 195–201; 8, pp. 227–236*).—In this thesis the author aims to answer the above questions.

How to grow black walnuts, C. A. SCOTT (*Kansas Sta. Circ. 13, pp. 3*).—This circular contains brief suggestions relative to preparing the seed for planting, where and how to plant, and the cultivation and care of black walnut.

DISEASES OF PLANTS.

Diseases of economic plants, F. L. STEVENS and J. G. HALL (*New York, 1910, pp. X+513, figs. 219*).—This work treats primarily of the diseases of economic plants which are due to attacks of fungi, bacteria, slime molds, etc., although some attention is given to those troubles generally attributed to physiological disturbances due to environmental or other causes. The book is designed for those who wish to recognize and treat plant diseases without an extended investigation as to their causes, and the information is largely drawn from the authors' experience, supplemented by the published results of investigations at the various agricultural experiment stations and this Department.

The characters used in describing diseases are the more obvious ones, such as appear to the eye with or without a hand lens, and technical discussions are eliminated as far as possible. After describing the disease the best methods of combating it are given. The diseases are grouped according to crops, and chapters are given on fungicides, spraying, soil disinfection, plant sanitation, etc.

Plant diseases, M. HOFFMANN (*Jahresber. Landw., 24 (1909), pp. 203–210*).—Brief abstracts are given of several of the more important papers on fungus diseases of economic plants issued in Germany, mainly during 1909, including articles on rusts and smuts of cereals and their control (E. S. R., 21, p. 446; 22, p. 745; 23, p. 46), the heart or dry rot of sugar beets (E. S. R., 21, p. 446), and the leaf-roll disease of the potato (E. S. R., 21, p. 243).

Report on plant diseases, E. JORDI (*Jahresber. Landw. Schule Rütti, 1909–10, pp. 108–114*).—Tabulated statements are given of reports from various sections on the prevalence of grain smuts and the use of seed soaking as a remedy, on the leaf roll and blackleg of potatoes and the most susceptible varieties, and on the general appearance and yield of cherries and other stone fruits.

In experiments conducted by the station on the control of stinking smut of wheat and rye it was found that soaking the seed in a 0.2 per cent solution of formalin gave the best results with both crops, while a 0.1 per cent solution of formalin and a 0.5 per cent solution of copper sulphate was less favorable. The germination of the rye was not more injured by the soaking than the wheat.

Comparisons of the yields of certain varieties of cereals from rusted plants and from healthy plants showed that the rusted plants gave from $\frac{1}{10}$ to $\frac{1}{4}$ less yield in grain. The breeding and cultivation of rust-resistant varieties is therefore recommended.

Mycological review for the year 1909, G. BRIOSI (*Bol. Min. Agr., Indus. e Com. [Rome], 9 (1910), Ser. C, No. 5, pp. 79–88*).—After discussing the common diseases of the clovers and vetches, a list of plant diseases examined and identified during the year at the botanical station at Pavia is given.

Mycological notes, F. Bubák and J. E. Kabát (*Hedwigia*, *47* (*1908*), *No. 6*, *pp. 354–364*, *fig. 1*).—In a taxonomic discussion of several species of fungi from Bohemia, the following of economic importance are described: *Phyllosticta albomaculans* n. sp. on the leaves of *Prunus padus*, *Phyllosticta iserana* n. sp. on the leaves of *Salix fragilis*, *Ascochyta æsculi* n. sp. on *Æsculus hippocastanum bicolor*, *Ascochyta grandispora* n. sp. on *Symphoricarpus orbiculatus*, *A. lappæ* on *Lappa minor*, *A. pallida* n. sp. on *Acer platanoides bicolor*, *Ascochyta pruni* n. sp. on *Prunus padus*, *A. populicola* n. sp. on *Populus alba*, *A. symphoriæ* n. sp. on *Symphoricarpus racemosa*, *A. syringicola* n. sp. on *Syringa vulgaris*, and *Uromyces bäumlerianus* n. sp. on *Melilotus alba*.

New or rare fungi, F. Bubák (*Ann. Mycol.*, *6* (*1908*), *No. 1*, *pp. 22–29*, *figs. 3*).—In a taxonomic discussion of several species of fungi the author describes as new *Puccinia bäumleriana* on *Anthemis tinctoria* from Hungary, *Phyllosticta malkoffii* on *Gossypium herbaceum* from Bulgaria, and *Ascochyta ferdinandi* on *Sambucus ebulus*, also from Bulgaria.

Report on cultures of Uredineæ, E. Fischer (*Centbl. Bakt.* [*etc.*], *2. Abt.*, *28* (*1910*), *No. 4–5*, *pp. 139–152*).—The author reports successful inoculation cultures as follows: Æcidiospores of *Æcidium euphorbiæ gerardianæ* from *Euphorbia geradiana* on *Saponaria ocymoides* produced both uredo and teleutospores of *Uromyces caryophyllinus*, but the attempt was unsuccessful on *Dianthus silvestris*. Teleutospores of *Gymnosporangium tremelloides* from *Juniperus communis* produced æcidia on *Sorbus aria*, *S. hybrida*, *S. latifolia*, and *S. chamæmespilus* (in one instance). Æcidiospores of *Ochropsora sorbi* from *Anemone nemorosa* produced sori on *S. aucuparia*, *S. aria*, *S. fennica*, *S. americana*, and *Pirus communis*, and æcidiospores from the same host also produced sori on *Aruncus silvestris*. Teleutospores of *Puccinia albulensis* from *Veronica alpina* produced sori on *V. bellidioides* and *V. aphylla*.

Apparatus for the treatment of grain by the hot-water method, R. Schander (*Deut. Landw. Presse*, *37* (*1910*), *No. 30*, *pp. 333*, *334*, *figs. 5*).—Descriptions and figures are given of several types of apparatus for use when treating wheat, barley, etc., by the hot-water method for the loose smut of grain, together with a brief account of this method and the results obtained by its use.

Experiments on the control of loose smut of wheat and barley by means of hot water and hot air, R. Schander (*Landw. Centbl. Posen*, *1910*, *No. 5*; *abs. in Centbl. Bakt.* [*etc.*], *2. Abt.*, *28* (*1910*), *No. 9–11*, *p. 302*).—The results are given of tests with wheat and barley seed, in which the grain after soaking for 4 hours in cold water was placed for 10 minutes in hot water at 56° C., and also at 54°. In the first instance the smut was entirely destroyed, and in the second, practically so.

Tests of the hot-air treatment did not give satisfactory results.

On the control of the loose smut of barley, P. Gisevius and Böhmer (*Illus. Landw. Ztg.*, *30* (*1910*), *No. 77*, *p. 725*, *fig. 1*).—The authors describe a drying apparatus to be used in the hot air method (E. S. R., 23, p. 46) of combating loose smut of grain, which is smaller and cheaper than those usually described and offered for sale, and is intended for farmers planting small areas to barley where a large machine is unnecessary.

Relative rust resistance and yield of various varieties of wheat and oats, W. J. Lamont (*Agr. Jour. Cape Good Hope*, *37* (*1910*), *No. 3*, *pp. 243–248*).—The author compares 22 varieties of wheat tested during 1909 as to rust resistance, growing characters, bread-making qualities, milling properties, and yield.

The old Rietti, a variety imported in 1896, has so far proved to be the only wheat which has withstood rust uniformly well in the Western Province, but it is not a good milling wheat, is very late, and sheds its grain very easily. Of the other varieties tested, only Theunissen, a strain of Rietti, and Thew promise to be valuable.

Of the 4 varieties of oats tested, all proved rust resistant during 1908 and 1909, while the variety called Texas was especially valuable on account of its good hay and heavy yield of grain.

Some observations on bunt and fungicides, G. P. DARNELL-SMITH (*Agr. Gaz. N. S. Wales, 21 (1910), No. 9, pp. 751–756, pl. 1, figs. 3*).—A report is made on a series of observations on bunt of wheat (*Tilletia tritici* and *T. levis*) conducted at the Milson Island Experiment Station, in which the point of infection on the grain, resistance of certain varieties of wheat to smut, and the effects of certain fungicides on the germination of the grain, were tested.

It is claimed that in artificially infected grain, the bunt spores adhere chiefly to the brush or tuft of hairs on the end of the grain opposite to the embryo, which situation affords ideal conditions for their development by reason of the air entangled in the tuft of hairs. The seed coat, being weakest at that end, bursts there first during germination, thereby permitting the easy access of the smut hyphæ into the interior of the grain.

Three varieties of wheat proved immune to both species of bunt, even when the seed planted were previously dusted with bunt spores, while non-resistant varieties treated in the same manner produced smutty heads.

In the tests with fungicides, formalin, copper sulphate and lime, and copper sulphate alone being used, it was found that the 2 per cent solution of copper sulphate injured seriously the germination of the seed. Subsequent treatment with lime prevented this deleterious effect.

A new disease of alfalfa, G. ARNAUD (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 31 (1910), No. 43, pp. 517–519, fig. 1*).—Attention is called to the appearance on alfalfa in France of this well known wilt of cotton, cowpeas, etc. The causal organism, *Neocosmospora vasinfecta* (E. S. R., 11, p. 944), is figured and described. The selection of resistant varieties, crop rotation, and the disinfection of the soil with carbon bisulphid and formalin are suggested as remedies.

Cotton diseases in Mississippi, R. P. HIBBARD (*Mississippi Sta. Bul. 140, pp. 27, figs. 8*).—This contains a popular discussion of cotton diseases in general and of the symptoms, cause, and remedies of the following specific diseases: Cotton wilt (*Neocosmospora vasinfecta*), anthracnose (*Colletotrichum gossypii*), cotton rust (physiological), red rust (*Tetranychus telarius*), sore shin (*Rhizoctonia* sp.), bacterial blight (*Bacterium malvacearum*), shedding of bolls (physiological), root galls (*Heterodera radicicola*), root rot (*Ozonium omnivorum*), areolate mildew (*Ramularia areola*), and cotton leaf blight (*Cercospora gossypina*). A bibliography of cotton diseases is appended

Cotton diseases in Mississippi, R. P. HIBBARD (*Mississippi Sta. Bul. 140–B, pp. 16, figs. 8*).—A reprint of those portions of the above bulletin which deal with the specific diseases of cotton.

On the leaf roll and other diseases of the potato, K. STÖRMER (*Illus. Landw. Ztg., 30 (1910), No. 71, pp. 667, 668*).—In a discussion of the causes of leaf roll and late blight of the potato, the author claims that if the weather conditions during the fall are favorable to a thorough ripening of the tubers and such tubers are used for seed the following spring there will be no epidemic of leaf roll or Phytophthora that year.

Varieties of potatoes resistant to wart disease (*Jour. Bd. Agr. [London], 17 (1910), No. 7, pp. 556–558*).—The results are given of a series of experiments conducted in 1909 and 1910 on the resistance of various varieties of potatoes to the wart disease.

The potatoes were planted in soil thoroughly infected with the spores of the fungus. For 1909, 5 varieties were found resistant, though of these only 2 proved absolutely immune in 1910. All of the 5 varieties gave a fairly clean sample during both periods.

In some of the soils the resistant varieties gave poor yields, while in others they gave good returns. On the same soils the check experiments with non-resistant varieties gave badly infected tubers.

It is therefore claimed that, by planting resistant varieties which are suited to the soil conditions, a good crop can be obtained even on land badly infected with the disease.

Diseases of sugar cane, L. C. and A. MAUBLANC (*Agr. Prat. Pays Chauds, 10 (1910), Nos. 90, pp. 232–252, figs. 4; 91, pp. 312–320, fig. 1; 92, pp. 379–400, figs. 4; 93, pp. 502–506, fig. 1*).—Descriptions are given of a number of the more important diseases of the sugar cane, the information being largely drawn from the notes and work of G. Delacroix.

The principal fungi causing the diseases are *Thielaviopsis paradoxa*, *Coniothyrium sacchari*, *Lasiodiplodia theobromæ*, *Marasmius sacchari*, *Schizophyllum commune*, and *Ithyphallus impudicus*.

Descriptions are also given of some of the bacterial diseases of cane, together with an account of the disease known as sereh and a number of the other less known diseases.

Blackleg or Phoma wilt of cabbage, T. F. MANNS (*Science, n. ser., 32 (1910), No. 829, pp. 726, 727*).—Attention is called to the appearance of *Phoma oleracea* in the cabbage districts of Clyde and Fremont, Sandusky County, Ohio, where it has, in conjunction with the Fusarium wilt, driven many cabbage growers out of business. During 1910 the disease has been reported from several other localities in the State. It is apparently new to the United States, but has been for many years a source of serious loss to cabbage and cauliflower growers in various European countries, and also in Australia.

White, slightly sunken, elongated oval areas appear on the stems, usually below the point of leaf attachment. Soon small black pycnidia appear in these lesions, from which myriads of spores are discharged at the time of transplanting. Later these lesions break and bacterial decay sets in. The collar rot is effected by the confluence of the lesions involving the destruction of the cambium, causing the margins of the outer leaves to take on a reddish color, followed shortly by wilt and a quick collapse of the entire plant. Soon the stem becomes so badly rotted that the wind often breaks the plant loose from the roots and blows it away. One-half to two-thirds grown plants are usually the worst attacked by the disease.

A preliminary bulletin concerning the nature of the disease and methods of control is being prepared.

Mycological notes, F. VON HÖHNEL (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl., 118 (1909), I, No. 9, pp. 1461–1552, fig. 1*).—In a taxonomic discussion of various species of fungi the author describes a new cruciferous rust, *Puccinia streptanthi* n. sp., on the stems of *Streptanthus* sp. in California.

Apple bitter rot, C. P. LOUNSBURY (*Agr. Jour. Cape Good Hope, 37 (1910), No. 4, pp. 355–364, pl. 1*).—The presence of bitter rot (*Glomerella rufomaculans*) is reported in several districts in Cape Colony, where in some instances it has become a serious menace to the culture of certain varieties of apples. The symptoms, means of distribution, and methods of control are given.

The use of sulphate of iron in attacks of chlorosis, M. COFFIGNIEZ (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 31 (1910), No. 45, pp. 577–579*).—The author gives a report of experiments begun in 1908, in which he introduced sulphate of iron into pear trees badly attacked with chlorosis. In subsequent seasons when the leaves were put out they had regained their normal green color and heavy crops of fruit were produced.

It is recommended that in this treatment holes be bored in the trunk or limbs to a depth of about half the diameter of the trunk or limb, and inclined at an angle of 45°. This will facilitate the introduction of the sulphate of iron, after which the holes should be closed and covered with grafting wax. So far as the author's investigations have gone, they indicate that the operation should be carried on at about the end of July.

Silver-leaf disease, Duke of Bedford and S. U. Pickering (*Woburn Expt. Fruit Farm Rpt., 12 (1910), pp. 1–34; rev. in Gard. Chron., 3. ser., 48 (1910), No. 1246, pp. 356, 357, figs. 7*).—A description is given of inoculation experiments with this disease, which attacks many kinds of trees, especially plum and other stone fruits.

The disease is of long standing in England, and manifests itself by the foliage of infected trees becoming light and silvery in appearance. Later the trees may die, although death may not occur for several years, during which time the diseased trees may still bear some fruit and show considerable vigor of growth.

In one series of experiments 48 2-year-old plum trees were inoculated by inserting under the bark pieces from 2 to 3 mm. in diameter of the sporophore of *Stereum purpureum* obtained from a plum tree killed by silver leaf. Of these 39, or 81 per cent, showed silvering before the end of July, 4 of which were killed outright, 2 partially killed, 8 others entirely silvered, and the remaining 25 only partially silvered. Of 64 uninoculated trees, not one showed any signs of silvering. Nineteen of the inoculated trees died during the first 2 years after planting, all of which developed *S. purpureum* on the dead wood, while none of the uninoculated trees died or showed any signs of the fungus during this period.

The results are also given of inoculating different parts of the trees, such as stems, branches, and roots, and of inoculating various kinds of trees, such as plums, apples, laburnums, laurels, and pears, with Stereum from various sources. None of the trees tested were found immune to the disease, although no Stereum could be obtained from the silvered laurels.

No trace of the fungus hyphæ was found in the silvered leaves, nor could infection be produced by using crushed silvered leaves as inoculating material; neither could trees be infected by alternately using pruning tools on the living parts of diseased and healthy trees. Attempts to graft diseased scions on healthy stocks and healthy scions on diseased stocks were unsuccessful, as no juncture between scion and stock would result.

Apparently the disease can not be communicated from one tree to another through the roots or from the soil, as diseased and healthy trees were grown in such close proximity that the roots must have intermingled, while healthy trees planted in the position formerly occupied by diseased trees showed no special tendency to the disease.

The silvering of the leaves on the inoculated trees may occur in one week from the date of inoculation, while the entire tree may become seriously affected within 4 or 5 weeks.

Soft wooded varieties of plums seemed to be more susceptible to this disease than any other, although in a plantation of many thousands of trees only 2.8 per cent were affected, while other varieties showed from 0.1 to 0.4 per cent of silver leaf.

As a result of these experiments the authors claim that *S. purpureum* is undoubtedly the primary cause of silver leaf, and that the outward manifestation of the disease is due to a poison formed during the growth of the fungus, while the silvery appearance of the leaves is caused by their cells becoming partially disconnected, owing to changes brought about in the nutrition of the plant. Some of the trees which were affected by the disease apparently fully recovered.

Treatment with iron sulphate proved valueless, and the only known method of combating the disease is by destroying the badly affected trees, especially the dead limbs, or the entire tree when dead, as it seems that the fungus enters by means of the spores which are produced only on dead wood.

The deformation of Prunus mahaleb by a parasitic fungus, M. MOREILLON (*Jour. Forest. Suisse, 61 (1910), No. 2, pp. 31–35; Schweiz. Ztschr. Forstw., 61 (1910), No. 5, pp. 152–155, figs. 3; abs. in Bot. Centbl., 114 (1910), No. 14, p. 361*).—Attention is called to a disease of this plant which kills portions of the inflorescence and of the young foliage, this being followed by a development of young axillary buds after each yearly attack, until in the course of time the bush shows a peculiar dichotomous like type of branching.

The fungus was identified by D. Cruchet as *Cucurbitaria pruni mahaleb*, and was associated with another parasite which he named and described as *Myxosporium pruni mahaleb* n. sp.

The principal diseases of our vineyards, A. I. PEROLD (*Agr. Jour. Cape Good Hope, 37 (1910), No. 4, pp. 370–377*).—It is claimed that in the southwestern districts of South Africa the most dreaded vine diseases of other countries have not yet made their appearance, mainly because of the dry summers which are unfavorable to the development of most fungus diseases.

However, two diseases are prevalent there, viz, white rust (*Oïdium tuckeri*) and anthracnose. For the Oïdium, sulphuring the vines 3 times with flowers of sulphur is recommended, first, when the young shoots are 6 in. high, second, when the vines begin to flower, and third, just before the berries become soft and transparent. For combating the anthracnose during the summer, a mixture of lime and sulphur is dusted on the vines, but a winter treatment consisting of washing the bark with a mixture of 110 lbs. of sulphate of iron, $1\frac{1}{3}$ bottles of strong sulphuric acid, and 22 gal. of hot water, gave better results.

On a case of court-noué of grapes in France, P. JACCARD (*Arch. Sci. Phys. et Nat. [Geneva], 4. ser., 28 (1909), No. 11, pp. 519–521; abs. in Centbl. Bakt. [etc.], 2. Abt., 28 (1910), No. 9–11, pp. 282, 283*).—The author states that in a vineyard of some 10,000 5-year-old grafted vines this disease has become so prevalent that three-fourths of the plants are attacked, resulting in a much reduced yield.

No evidence of animal or plant parasites was found in the diseased tissues, but an examination of the twigs and leaves during the latter part of August showed a lignification and an accumulation of starch in the smaller branches, an arrested development of the leaves, and an alteration of their chlorophyll. The leaves, when viewed by transmitted light, showed a brownish or reddish color along the veins, while the cells at the base of the petioles showed alterations in the middle lamellæ and an excess of calcium oxalate throughout the petioles.

The author claims that it is a true physiological enzymatic disease, due probably to an imperfect adaptation of the grafted stocks to the soil or subsoil.

The gray rot (Botrytis) of grapes in 1910, L. LEBRUN (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 31 (1910), No. 43, pp. 502–509*).—The author discusses the serious loss during this year to Burgundian vineyardists due to the widespread and severe attacks of this fungus, and gives tables showing the amount and number of hours of rainfall for each May, June, and July, from 1907 to 1910, inclusive, together with the mean temperatures for these months.

After comparing the relative amount of gray rot during each of these years with the temperature and rainfall, the conclusion is reached that the unusual amount of rot for 1910 is due to the extra amount of continuous rainfall, especially during June, coupled with the prevalence of an optimum temperature for the germination of the spores.

The red leaf spot of grapes and its control, DÜMMLER (*Wchnbl. Landw. Ver. Baden, 1910, p. 415; abs. in Ztschr. Landw. Versuchsw. Österr., 13 (1910), No. 6, p. 597*).—It is claimed that an early spraying with a 2 per cent Bordeaux mixture before the disease appears will prevent it, and that if the disease has already appeared, spraying will put a stop to further injury. The injury can also be lessened by improving the soil conditions.

Note on coffees resistant to Hemileia vastatrix, P. DUSSERT (*Agr. Prat. Pays Chauds, 10 (1910), No. 91, pp. 337, 338*).—An account is given of observations on a number of species of coffee cultivated in Madagascar, some of which seem more or less resistant to the coffee leaf rust (*H. vastatrix*). Among the forms which are somewhat resistant are *Coffea congensis chalotii*, *C. canephora opaca*, and *C. javanica*. The author states that unlike the Liberian coffee the quality of the beverage produced from the Madagascan berry is very agreeable.

The bud rot of palms in India, E. J. BUTLER (*Mem. Dept. Agr. India, Bot. Ser., 3 (1910), No. 5, pp. 221–280, pls. 5, map 1, fig. 1*).—The author discusses the history of the bud rot of palms, the area affected, the first appearance and spread of the disease, the species of palm attacked, the seasonal prevalence, symptoms, and characteristics of the causal organism, and measures for controlling the disease.

It is claimed that the special bud rot under discussion is caused by *Pythium palmivorum* (E. S. R., 20, p. 454), a fungus parasite which attacks principally the palmyra palm (*Borassus flabellifer*), and has caused the death of thousands of trees in the Godavari and Kistna districts since its first appearance in 1890.

The spores of the fungus are usually found between the soft inner leaf sheaths, and are therefore not readily disseminated by the wind. The chief agency in spreading the disease is supposed to be the palm climbers, who, while gathering the leaves for thatching or tapping the trees for toddy and jaggery (raw sugar), carry the fungus from diseased to healthy trees. Insects or other animals may also aid in its dissemination, especially the rhinoceros beetle and the palm weevil.

Four species of palms are common in the Delta, viz, the palmyra (*B. flabellifer*), the coconut (*Cocos nucifera*), the areca (*Areca catechu*), and the date (*Phœnix sylvestris*). Of these, the first three are subject to the disease, while the date is apparently immune. The palmyra palm is more subject to attack than the other two, because it is the one climbed most frequently, and is therefore oftener infected. For the same reason the disease is far less common on seedlings and young trees of the palmyra than on mature trees which are large enough to be climbed regularly.

The disease is usually confined in its earlier stages to the large, fleshy leaf sheaths just below the expanded crown of leaves, and is not observable as a rule until the fungus reaches the young soft tissues of the unexpanded leaves, where it spreads rapidly and soon destroys the center of the bud. The cluster of partially expanded leaves in the center of the crown is next affected, causing the central sheath to wither, which is usually the first external indication of the disease in standing trees. The affected leaves turn pale, wither, and finally become dry and yellowish brown in from 10 to 12 days.

Systematic cutting and destruction of all diseased trees is the only remedy found of value in combating the disease.

The rot of roses, J. BEAUVERIE (*La Pourriture des Roses. Lyon, 1910, pp. 8, figs. 5; reprint from Les Amis des Roses, 1910, July–Aug.*).—The author describes the symptoms of this disease, its cause, and the microscopic characteristics of the causal organism, *Botrytis cinerea*, and gives the methods usually employed in combating the disease.

The rot attacks the peduncles and buds just at flowering time, producing brown areas on the peduncles and causing the petals to wither and turn a brownish color. Spraying with limewater, sulphate of lime, bisulphite of magnesia, sulphate of nickel, sulphate of copper, formalin, and silicates of magnesia are suggested as preventives.

Mildew injuries in the forest district of Lekenik, EIGNER (*Naturw. Ztschr. Forst u. Landw., 8 (1910), No. 10, pp. 498–500*).—In a discussion of the death of large numbers of oak trees in Croatia, the author claims that it was not due alone to the mildew, as many hold, but also to the defoliation of the trees for two years by caterpillars, this being followed in 1909 by the destruction by the fungus of the new leaves subsequently formed, thereby weakening the trees until they died.

The mildew of the oak, P. VUILLEMIN (*Rev. Gén. Sci., 21 (1910), No. 19, pp. 812–816*).—The author discusses the taxonomic position, probable source of introduction into Europe, and subsequent dissemination of the oak mildew, which has become epidemic in many European countries during recent years. It is claimed that the fungus belongs neither to the genus Phyllactinia nor to Microsphæra, but judging from its conidia, is a Sphærotheca, and will probably prove to be *S. lanestris.*

A parasite of the oak Oïdium, P. VUILLEMIN (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 15, pp. 647, 648; Bul. Trimest. Soc. Mycol. France, 26 (1910), No. 4, pp. 390–393*).—Attention is called to the appearance in the forests of France of *Cicinnobolus cesatii evonymi*, a fungus parasitic on the Oïdium, which has become so prevalent throughout European countries in recent years on various species of oaks.

It is claimed that by the introduction of this beneficial parasite into regions where the Oïdium is so injurious, the disease may be held in check.

A maple tree fungus, A. HOLLICK (*Proc. Staten Isl. Assoc. Arts and Sci., 2 (1909), No. 4, pp. 190–192*).—Attention is called to the death of silver maples (*Acer saccharinum*) and other vegetation along the north shore of Staten Island from New Brighton to West New Brighton, N. Y., caused primarily by the smoke and gases from factories on the New Jersey shore which year after year have either partially or completely defoliated the trees, occasionally two to three times in a season, until the twigs and branches have died and broken off.

The wounds thus formed became the center of infection for fungus invasion which finally completed their destruction. The fungus found on the maples was *Pyropolyporus igniarius*, a well-known wound parasite of trees.

Some diseases of rubber trees (*Agr. News [Barbados], 9 (1910), Nos. 219, pp. 302, 303; 220, p. 318; 221, pp. 334, 335*).—In a summary of the diseases to which rubber trees are subject in different parts of the world, attention is called to their close similarity in external symptoms and causative fungi to many diseases of cacao.

The field symptoms, causal organisms, present distribution, and methods of control for the following are given: Root diseases, caused by *Fomes semitostus, Irpex flavus, Hymenochæte noxia*, and *Poria vincta*, and a foot rot of Castilloa trees in Ceylon due to *Fusarium* sp.; stem diseases, Ceylon canker (*Nectria diversispora*), Ceylon bark disease (*Corticium javanicum*), Malay bark disease (*C. calceum*), die back (*Glœosporium alborubrum* and *Botryodiplodia elasticæ*), black canker (*Fusicladium* sp.), bark disease (*Diplodia rapax*), stem disease (*Eutypa caulivora*), and horsehair blight (*Marasmius* sp.) on Hevea, and Funtumia canker (*Nectria funtumiæ*) and *Corticium javanicum* on Castilloa in

Java; fruit diseases, caused by fruit rot (*Phytophthora* sp.) on Hevea fruit, which is also found on cacao and bread fruit; seedling diseases, caused by gray blight (*Pestalozzia guepini*), also found on tea, and leaf spot (*Cercospora* sp.); leaf diseases, due to several species of fungi, none of very much importance.

The dry rot of construction timber, P. BILLIET (*Assoc. Franç. Avanc. Sci., Compt. Rend., 37 (1908), pp. 553–557*).—A description is given of the destruction caused by *Merulius lacrymans* in lumber and construction timber, the author claiming that the mycelium produces a considerable amount of liquid and that this liquid acts as a ferment, dissolving the cellulose of the cell walls, or, in more resistant wood, causing their swelling and finally their destruction.

Dry rot in timber, W. RANSOM (*Surveyor, 38 (1910), No. 982, pp. 643, 644*).—It is stated that in this disease, which appears to be on the increase, moderate warmth, moisture, and want of ventilation are favorable conditions for the development of the fungus (*Merulius lacrymans*), and that its attacks are confined almost exclusively to wood felled in the sap.

Thoroughly seasoned timber made from trees cut at the proper season, with sufficient ventilation around the timbers used in the building, will usually escape attacks of dry rot. The application of carbolic acid, creosote, carbolineum, etc., is also recommended as a preventive.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Animal migrations and their cause, F. KNAUER (*Tierwanderungen und ihre Ursachen. Cologne, 1909, pp. XI+288, figs. 80, map 1*).—The migrations of mammals, birds, insects, etc., are discussed in this work.

A bibliography of California ornithology, J. GRINNELL (*Cooper Ornithol. Club. Pacific Coast Avifauna, 1909, No. 5, pp. 166*).—In this bibliography 1,785 titles are listed in chronological order. Indexes to authors, local lists, and bird names, and a list of the serial publications from which articles are cited, are appended.

A check-list of the birds of South Africa, J. W. B. GUNNING and A. HAAGNER (*Ann. Transvaal Mus., 2 (1910), Sup., pp. 75–156*).—In this list 920 species are recorded as occurring south of the Zambesi-Cunene line, the sixteenth degree of south latitude.

Examination of contents of stomachs and crops of Australian birds, J. B. CLELAND (*Agr. Gaz. N. S. Wales, 21 (1910), No. 5, pp. 401–405*).—The results of an examination of the stomach contents of 57 birds are here reported.

The toads of the northeastern United States, W. DEW. MILLER and J. CHAPIN (*Science, n. ser., 32 (1910), No. 818, pp. 315–317*).—The authors discuss the range of *Bufo americanus* and *B. fowleri*, which they have collected and studied in New Jersey and neighboring regions.

Fish and game laws of Massachusetts, 1910, G. W. FIELD, J. W. DELANO, and G. H. GARFIELD (*Boston, 1910, pp. IX+128*).—The fish and game laws of Massachusetts have been brought together in this pocket guide.

A report on the fresh water protozoa of Tahiti, C. H. EDMONDSON (*Science, n. ser., 32 (1910), No. 819, pp. 349–351*).—Forty-four species were observed and studied by the author during July and August, 1908.

Bionomical observations on some British millipedes, T. J. EVANS (*Ann. and Mag. Nat. Hist., 8 ser., 6 (1910), No. 33, pp. 284–291*).—The observations reported deal with the habits, especially the breeding and molting habits, of 5 species and as many genera of British millipedes.

Friendly insects, W. W. FROGGATT (*Producers Rev., 5 (1910), No. 5, pp. 190–195, figs. 15*).—A popular account in which a number of beneficial insects are described and figured.

The effects of parasitic and other kinds of castration in insects, W. M. WHEELER (*Jour. Expt. Zool., 8 (1910), No. 4, pp. 377–437, figs. 8*).—In this paper the author first considers the effects of stylopization in wasps and bees. He then takes up and discusses the various ways by which castration takes place, including surgical, alimentary, nutricial, phasic, individual parasitic, and social parasitic castration.

An extensive bibliography is appended to the account.

Vegetable pests, C. FRENCH, Jr. (*Jour. Dept. Agr. Victoria, 7 (1910), No. 12, pp. 770–773*).—Brief notes are presented on the various pests which attack vegetables.

It is stated that thrips occur in Victoria in large numbers on early tomato plants, causing the flowers to turn brown, shrivel up, and fall. As a deterrent spraying with coal tar water or a weak kerosene emulsion is recommended. The coal tar water is made by boiling 1 lb. of coal tar in 2 gal. of water and while hot adding from 50 to 100 gal. of water.

Some insect pests affecting cultivated plants in the West Indies, R. NEWSTEAD (*Jour. Roy. Hort. Soc. [London], 36 (1910), No. 1, pp. 53–63, pls. 4, figs. 2*).—In this paper the author mentions ants (*Solenopsis* sp.) as destroying the flowers of cacao, the larvæ of a wood-boring beetle injuring the cacao tree, the girdler-weevil of the orange and cacao (*Prepodes vittatus*), slugs destroying Para rubber plants, the cabbage butterfly (*Pieris* sp.), a pyralid moth injuring beetroots, the sweet potato weevil (*Cylas formicarius*), the cotton stainer (*Dydercus ? andreæ*), scale insects infesting rubber, and others.

Insects and disease, R. W. DOANE (*New York, 1910, pp. XIV+227, pls. 54*).—This popular account of the way in which insects may spread or cause some of the common diseases includes a classified bibliography of nearly 50 pages of books and articles dealing more or less directly with the subject.

The North American dragonflies (Odonata) of the genus Macromia, E. B. WILLIAMSON (*Proc. U. S. Nat. Mus., 37 (1910), pp. 369–398, pls. 2, figs. 7*).—The American species of Macromia are said to be distributed generally over the United States and southern and eastern Canada. So far as known, *M. illinoiensis* is the only species frequenting lakes as well as streams. Nine species are recognized of which 3 are described as new to science.

A list of the Neuroptera of Ireland, J. J. F. X. KING and J. N. HALBERT (*Proc. Roy. Irish Acad., 28 (1910), No. 2, Sect. B, pp. 29–112; abs. in Jour. Roy. Micros. Soc. [London], 1910, No. 2, p. 166*).—This new list of Neuroptera, which includes 240 species representing 105 genera, is shown to be rather less than two-thirds of the number recorded from Great Britain. The nomenclature is brought up to date and emphasis is laid on cases of interesting geographical distribution. A bibliography of the literature relating to the subject is included.

Froghoppers, froghopper fungus, and froghopper control, F. W. URICH and J. B. RORER (*Proc. Agr. Soc. Trinidad and Tobago, 10 (1910), No. 9, pp. 368–382; separate, pp. 10*).—An interim report on froghoppers, which includes a bibliography of the subject, is presented by F. W. Urich, an account of the froghopper fungus by J. B. Rorer, and one on froghopper control by the first named author. *Tomaspis postica* is the insect concerned.

The wheat louse, C. P. VAN DER MERWE (*Dept. Agr. Orange River Colony Bul. 22, 1910, pp. 33, figs. 3*).—An account is given of the so-called green bug or spring grain aphis (*Toxoptera graminum*), which has been known in the Orange Free State for a long time and also occurs in Cape Colony, Transvaal, and Basutoland. It is said that while cases where the insect becomes destructive are not uncommon, these outbreaks are usually more or less local in character. An outbreak similar to that which occurred in the spring of 1908 has not been known before in the grain growing districts of the Colony.

The hackberry psylla, Pachypsylla celtidis-mammæ.—A study in comparative morphology, H. B. STOUGH (*Kans. Univ. Sci. Bul., 5 (1910), No. 9, pp. 121–165, pls. 9, figs. 3*).—In this paper the author reports studies of the comparative morphology of the mouth parts, thorax, and genitalia, and of the development of wing venation and wing pattern. A bibliography of 37 titles is appended.

White-fly control, E. W. BERGER (*Florida Sta. Bul. 103, pp. 5–28, figs. 2*).—The essential facts concerning white-fly control through the use of fungi and by spraying are here brought together in brief form.

Experiments on the artificial spreading of fungi show that there are definite advantages to be gained. It has been found that the yellow fungus thrives only on *Aleyrodes nubifera*. White-fly pupæ appear to be more or less immune to fungus attacks.

The operations and experiments of the past year indicate clearly that effective spraying can be done. "Temperature, as well as stage of development, is apparently a factor in successful spraying, since we would expect the solutions to be more penetrating when several degrees warmer. Thus only 91.3 per cent of the stages 1 to 3, and 30 per cent of the fourth stage, were killed with Golddust with an initial temperature of 88° and a mean for 7 days of 74.5°; while 99.5 per cent of the stages 2 and 3, and 89 per cent of the fourth and fifth stages were killed when the initial temperature was 99° and the mean for 7 days, 80.8°. The results of June 15 to 17 . . . on fourth-stage larvæ with the soap solutions were excellent, with an initial temperature of 98° and a mean of 83.1°." Directions are given for winter treatment, spring, summer, and fall spraying, etc. It is stated that the freezing destroys directly but few, if any, of the larvæ on leaves that remain uninjured.

The food plants of *A. citri* are listed, and it is recommended that the cape jasmine, chinaberry, umbrella trees, prickly ash, privets, wild olive, trifoliate orange (*Citrus trifoliata*) and all useless and abandoned citrus be condemned and destroyed in all citrus-growing communities.

A mealy bug injurious to the lebbek trees of Cairo, F. C. WILLCOCKS (*Bul. Ent. Research, 1 (1910), No. 2, pp. 121–141, pl. 1, figs. 10*).—The mealy bug concerned, which is described by the author and by R. Newstead in an appendix as *Dactylopius perniciosus*, may destroy the crown if not the entire tree in the short space of a few months. "In addition to the lebbek (*Albizzia lebbek*) and cotton (*Gossypium* spp.), *D. perniciosus* has been found on Christ's Thorn (*Zizyphus spina-christi*) and on the Sunt Tree (*Acacia arabica*)."

Nomenclature of scale insects, H. A. BALLOU (*West Indian Bul., 11 (1910), No. 1, pp. 35–38*).—The names of 46 species of the better known West Indian scale insects are presented in 3 columns, the first containing the old scientific names, the second the new scientific names, and the third the common names.

Notes on lime cultivation, H. A. BALLOU (*West Indian Bul., 11 (1910), No. 1, pp. 39–49*).—"The results obtained from the cultivation plats in Montserrat over a period of 3 years indicate that clean cultivation and frequent tillage produce vigorous growth, and heavy early bearing. This, however, is offset by the severe attacks of scale insects. The other plats are much alike in the condition of the trees, and in the yields. The effect indicated by plat 2, that clean cultivation is followed by attacks of scales, seems to be confirmed by the condition of the spineless limes at the Botanic Station, and of the abandoned trees at Richmond. . . . The scale insects concerned in the injury to the lime trees in Montserrat at present are the purple scale (*Mytilaspis citricola*), the white scale (*Chionaspis citri*), and the green scale (*Lecanium viride*)."

Some experiments on Bombyx mori, R. INOUYE (*Jour. Col. Agr. Imp. Univ. Tokyo, 2 (1910), No. 3, pp. 223–235, figs. 2*).—The author reports investigations made (1) of the quantity of mulberry leaves consumed by the several stages or instars in the development of the silkworm, and (2) of the influence of carbon dioxid on the silkworm.

Some notes on the Arctianæ of Japan, T. MIYAKE (*Jour. Col. Agr. Imp. Univ. Tokyo, 2 (1910), No. 3, pp. 207–212, fig. 1*).—The larvæ of 2 of the species here noted feed upon the mulberry tree, making 9 species of the subfamily known to be injurious to the mulberry.

Fruit flies and other insects attacking cultivated and wild fruits in New South Wales, W. B. GURNEY (*Agr. Gaz. N. S. Wales, 21 (1910), No. 5, pp. 423–433, pls. 2, figs. 8*).—This is a report of field investigations of the fruit flies.

The Queensland fruit fly (*Dacus tryoni*) and the Island fruit fly (*Trypeta musæ*) are found to be natives of New South Wales and to develop in wild fruits, but the common or Mediterranean fruit fly (*Ceratitis capitata*) has not been found as yet to develop in the native wild fruits. A braconid parasite was found in considerable numbers attacking the Queensland fruit fly maggots in thin-pulped wild fruits.

An outbreak of gadflies in Kentucky, H. GARMAN (*Kentucky Sta. Bul. 151, pp. 181–192, pls. 2, figs. 6*).—The large, brown gadfly *Tabanus exul* is described as having been the source of considerable injury to beef and dairy cattle in Henry and adjoining counties in 1910. Observations made at Tarascon on August 25 are reported, with suggestions for remedial and preventive treatment. A technical description of the fly accompanies the account.

Some observations on the bionomics of Tabanus par and T. tæniola, H. H. KING (*Bul. Ent. Research, 1 (1910), No. 2, pp. 99–104, pl. 1*).—It is stated that nothing has hitherto been published on the life history of any African species of the family Tabanidæ, except in the case of *T. biguttatus*.

The present status of our knowledge of the rôle of flies in the dissemination of parasitic diseases and of means for combating them, B. GALLI-VALERIO (*Centbl. Bakt. [etc.], 1. Abt., Orig., 54 (1910), No. 3, pp. 193–209*).—This is a general review in which references are given to the literature.

A note on the blood-sucking flies of Roumania, N. LEON (*Centbl. Bakt. [etc.], 1. Abt., Orig., 54 (1910), No. 6, pp. 521–523, fig. 1*).—The author records the occurrence of *Phlebotomus papatasii* in Roumania.

Notes on the oviposition of Stomoxys calcitrans and the breeding of muscid larvæ, M. LANGERON (*Compt. Rend. Soc. Biol. [Paris], 69 (1910), No. 28, pp. 230, 231*).—Brief notes are presented.

The house fly (Musca domestica), C. G. HEWITT (*Manchester, 1910, pp. XIII+195, pls. 9, fig. 1*).—The several papers previously noted (E. S. R., 23, p. 664) have been brought together and published in book form.

The modern mosquito extermination campaign, J. B. SMITH (*Engin. News, 64 (1910), No. 9, pp. 232, 233, figs. 5*).—In this account of the work being carried on in New Jersey, a power ditcher is described and illustrated. By means of this ditcher a crew of 5 men can dig 4,000 ft. of ditch in an 8-hour day and the cost reduced to about 2 cts. per running foot. The machine runs on planks over the marsh and the cutting knife is at the back so that the body is always ahead of the ditch.

How to control mosquitoes, with special reference to Anopheles, W. B. HERMS (*Cal. Bd. Health Mo. Bul., 6 (1910), No. 1, pp. 7–19, figs. 15*).—Successful mosquito control work is stated to have been conducted at several points in California.

The natural history of Bombay malaria, C. A. BENTLEY (*Jour. Bombay Nat. Hist. Soc., 20 (1910), No. 2, pp. 392–422, pls. 2*).—A careful examination of a considerable portion of Bombay has shown that there are 5 species of anopheline mosquitoes present on the island. Two of these, *Myzomyia culicifacies* and *Neocellia stephensi*, are active agents in the propagation of malaria, while *M. barbirostris* and *N. jamesi* though potent carriers do not appear to be very dangerous ones. The fifth species, *M. rossii*, apparently does not transmit the malarial parasites. Notes are presented on the identification, breeding habits, etc., of these species.

The larvæ of *Culex concolor* which is frequently found breeding in collections of water haunted by *N. stephensi* is said to destroy great numbers of this malarial transmitting species. Thus 4 large larvæ of *C. concolor* which the author placed in a bowl of water containing a number of larvæ of *N. stephensi* of different stages destroyed over 50 in a period of 2 hours. That they will act in a similar manner under natural conditions is thought to be shown by the fact that breeding places which early in the season contain large numbers of larvæ of *N. stephensi*, later in the season also contain larvæ of *C. concolor*, while still later the *C. concolor* alone remain. Mention is also made of other enemies of mosquito larvæ.

Observations of mosquitoes, B. GALLI-VALERIO and J. ROCHAZ DE JONGH (*Centbl. Bakt. [etc.], 1. Abt., Orig., 54 (1910), No. 1, pp. 21–27, figs. 2*).—Biological observations of mosquitoes at Lausanne from November 1, 1908, to November 1, 1909, are reported.

A synopsis of the fleas found on Mus norvegicus decumanus, M. rattus alexandrinus, and M. musculus, N. C. ROTHSCHILD (*Bul. Ent. Research, 1 (1910), No. 2, pp. 89–98, figs. 28*).—"The object of the present paper is to assist students and others toward the rapid identification of the fleas usually found on the common rats and mice."

The oak pruner, F. H. CHITTENDEN (*U. S. Dept. Agr., Bur. Ent. Circ. 130, pp. 7, fig. 1*).—This circular gives a brief description of the oak pruner (*Elaphidion villosum*), its distribution, food plants and injury, life history, habits, natural enemies, and remedies.

The author has found that the forms which breed in the North from amputated twigs are identical. "Available records show that the typical oak pruner occurs from New England westward to Michigan, and probably farther west, and southward through the District of Columbia and Virginia to North Carolina, while there are specimens in the United States National Museum labeled Texas."

It is stated that this insect or allied species will attack almost every form of deciduous tree, shrub, and vine with a woody stalk. Mention is made of injury to branches of the peach and shagbark hickory, as well as of the oak. "During 1908 the depredations by this species were widespread and general, injury having been reported in Massachusetts, Pennsylvania, Virginia, and Kansas to oak, elm, pear, and wistaria. The year following pecans were attacked in Alabama and Mississippi, and hickory and oak in Illinois. In 1910 the oak pruner attracted widespread attention in the States of New York, Connecticut, and Massachusetts and became the subject of many newspaper notices under the name of the 'gun-worm.'"

The parasite *Bracon eurygaster* has been reared from twigs inhabited by this insect and several species of birds have been recorded as feeding upon it. Where the species becomes injuriously abundant, it may be readily controlled by gathering and burning the pruned twigs.

Note on beetles on Turkish tobacco leaf, J. P. WRIGHT (*Jour. Quekett Micros. Club, 2. ser., 10 (1909), No. 65, p. 472; abs. in Jour. Roy. Micros. Soc. [London], 1910, No. 2, p. 165*).—The author finds that beetles from Turkish tobacco-leaf apparently thrive in napthalin. Bisulphid of carbon, however, effectually disposes of them.

Determinate evolution in the color pattern of the lady beetles, R. H. JOHNSON (*Carnegie Inst. Washington Pub. 122, pp. 104, figs. 92*).—A bibliography of 49 titles is appended to this account.

The status of the cotton boll weevil in 1909, W. D. HUNTER (*U. S. Dept. Agr., Bur. Ent. Circ. 122, pp. 12, fig. 1*).—At the end of the year 1909 all of Louisiana was within the infested territory, while in Mississippi, Arkansas, and Oklahoma, 23, 20, and 15 counties, respectively, were more or less infested.

"Of the total cotton acreage in the States concerned, the weevil is found in about 80 per cent in Texas, 30 per cent in Arkansas, 25 per cent in Mississippi, 35 per cent in Oklahoma, and practically 100 per cent in Louisiana. This area comprises very nearly 30 per cent of the cotton acreage in the United States in the year 1909, or about 37 per cent of the total number of square miles found within the cotton belt. . . . The season of 1909 was very peculiar as regards damage by the boll weevil. . . . Experiments performed with many thousands of weevils in large field cages showed a survival of about 3 per cent as against 12 per cent after the winter preceding the season of 1907. That is, about 4 times as many weevils survived to damage the crop in 1907 as in 1908. . . . It was found that in the representative fields examined there was an average of only 3 weevils per acre in northern and eastern Texas in 1908 as against 226 per acre in 1907." As a result of the drought in 1909 the cotton plant was so stunted that it was unable to derive any advantage whatever from the comparative scarcity of the weevils.

"In spite of the most unfavorable conditions the parasites caused a considerable weevil mortality. The average total control of the boll weevil by its insect enemies throughout the season of 1909 was 16 per cent. . . . It is very noticeable that the work of the parasites in hanging squares was considerable. It ranged in Texas from 46 to 54 per cent. That is, nearly half of the weevil stages found in hanging squares were destroyed by natural enemies. . . . The list now includes 49 forms, of which 26 are parasites in the true sense—that is, dependent upon the boll weevil for furnishing food for their young, because their eggs are deposited upon the weevil—and 23 are predatory species, which merely devour the boll weevil but do not deposit their eggs upon or in it."

The dispersion in 1909, history of the boll weevil in Texas, use of the chain cultivator to carry the infested squares from shaded areas to the middles where they are exposed to the sun, and the use of arsenate of lead in combating the weevil as previously noted (E. S. R., 22, p. 756), are discussed at some length.

Studies of North American weevils, W. D. PIERCE (*Proc. U. S. Nat. Mus., 37 (1910), pp. 325–364*).—This paper includes descriptions of 12 new species of Curculionidæ.

Brood diseases of bees, their treatment and the law for their suppression in Massachusetts, B. N. GATES (*Bd. Agr. [Mass.], Apiary Insp. Bul. 1, 1910, pp. 12*).—A popular account.

The present status of our knowledge of African bees, H. FRIESE (*Die Bienen Afrikas nach dem Stande unserer heutigen Kenntnisse. Jena, 1909, pp. 85–475, pls. 2, fig. 1, maps 19; rev. in Science, n. ser., 31 (1910), No. 798, pp. 580–582*).—Practically all that is known of the bee fauna of the Ethiopian region south of a line drawn from Senegal to Abyssinia has been brought together in this work.

A series of maps of Africa show the distribution of various species, while other maps show the distribution throughout the world of important genera of African bees. The work includes a list of 35 genera and some 783 forms of African bees (including the subspecies of *Apis mellifica*), 53 of which species are described as new in the present volume. Two colored plates of bees are included in the work.

The review is by W. M. Wheeler.

A contribution on the bee fauna of the Lesser Antilles and the Bermudas, H. Friese (*Zool. Jahrb., 1908, Sup. 11, No. 1, pp. 33–40*).—The author describes 2 new species and 1 variety and presents a list of 60 species known to occur in the Lesser Antilles, Bahamas, and Bermudas.

A Bembex preying on Glossina in Dahomey, E. Roubaud (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 8, pp. 505–508*).—The wasp mentioned, which apparently belongs to the genus Bembex, is one of the small number of species that are known to capture blood-sucking flies.

An introduction to the study of the ants of northern Colorado, W. W. Robbins (*Univ. Colo. Studies, 7 (1910), No. 4, pp. 215–222, figs. 3*).—This paper includes an artificial key to the genera and a preliminary list of the species known to occur in northern Colorado, together with notes on their distribution and habits and a partial list of papers mentioning Colorado ants.

A note on the development of the gallfly, Diastrophus nebulosus, J. D. Ives (*Jour. Elisha Mitchell Sci. Soc., 26 (1910), No. 2, p. 76*).—The author reports the average number of larvæ taken from blackberry knot galls in January to be about 85. "In certain of the galls the number of parasitic or inquilinus larvæ, namely, those of *Torymus sackeni* and *Eurytoma* sp. exceeded those of *D. nebulosus*."

A contribution to the biology of the stone-fruit sawfly, H. Schmidt (*Ztschr. Wiss. Insektenbiol., 6 (1910), Nos. 1, pp. 17–23, figs. 18; 3, pp. 86–92, figs. 3*).—The species here considered, *Lyda nemoralis*, was the source of considerable injury to stone fruits in the vicinity of Grünberg, Silesia, in 1908.

Further notes on the acarids attacking the tea plant, C. Bernard (*Bul. Dépt. Agr. Indes Néerland., 1910, No. 40, pp. 1–9*).—Remedial measures for *Brevipalpus obovatus* and other acarids that attack the tea plant in Java are discussed. See also a previons note (E. S. R., 21, p. 658).

On some acarids indirectly related to tea culture, C. Bernard (*Bul. Dépt. Agr. Indes Néerland., 1910, No. 40, pp. 25–36, pls. 2*).—Mention is made of an acarid belonging to the genus Phytoptus that forms galls upon *Indigofera galegoides*, a plant used in green manuring, and a red spider (*Tetranychus* sp.) that appears in nurseries on the leaves of cinchona and manioc or cassava.

A new gall mite on Cratægus oxyacanthoides, J. Cotte (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 12, pp. 643–645, fig. 1*).—The author describes a new species (*Eriophyes cratægumplicans*), which makes galls on the upper surface of hawthorn leaves (*C. oxyacanthoides*).

On the presence of a flagellate parasite of the genus Leptomonas in the latex of three species of Euphorbiaceæ, A. Lafont (*Ann. Inst. Pasteur, 24 (1910), No. 3, pp. 205–219, figs. 7*).—Further investigations (E. S. R., 22, p. 251) have resulted in the discovery of this parasite in 2 additional species of Euphorbia that occur on the Island of Mauritius, namely, *Euphorbia thymifolia*, and *E. hypericifolia*. Its injury to the plant has been termed flagellosis.

Of 205 *E. pilulifera* plants examined, 70 were found to be parasitized. The sap of 50 additional species was examined without finding the parasite. At the time of writing the flagellate had been found or reported to occur in the neighboring island of Réunion or Bourbon, in Madagascar near Tamatave, and at Madras, India (E. S. R., 22, p. 288). It is said to have been discovered several times in the intestines of lygeid bugs, captured upon parasitized plants.

Eradication of ticks by the starvation method, H. E. LAWS and B. MANNING (*Agr. Jour. Cape Good Hope, 37 (1910), No. 1, pp. 9–17; Natal Agr. Jour., 15 (1910), No. 2, pp. 196–206; abs. in Vet. Jour., 66 (1910), No. 423, pp. 549–553*).—From the experiments reported the authors conclude that so long as game have access to an inclosed area total eradication of the several species concerned will be impossible. Periodic dipping in an efficient dip at intervals of not more than 14 days is considered more effective in the extermination of ticks of all kinds than starvation, and at the same time has the advantage that it can be carried on in conjunction with the ordinary farm work.

The relationship of ticks and animal disease, R. W. JACK (*Rhodesia Agr. Jour., 7 (1910), No. 6, pp. 1478–1497, pls. 3*).—A brief summarized account.

The insects injurious or beneficial to sugar cane in Formosa, S. MATSUMURA (*Ztschr. Wiss. Insektenbiol., 6 (1910), Nos. 3, pp. 101–104; 4, pp. 136–139*).—This gives a list of 125 injurious and 41 beneficial species collected by the author in Formosa.

The insect galls of Michigan, M. T. COOK (*Mich. Geol. and Biol. Surv. Pub. 1, Biol. Ser. 1, 1910, pp. 23–33*).—The host plants upon which the 59 species of galls here mentioned occur are distributed among 14 genera of 11 families of 9 orders.

Note on two new insecticidal agents, R. H. PETTIT (*Rpt. Mich. Acad. Sci., 10 (1908), pp. 159, 160*).—A remedy devised for use against *Cimex lectularius*, and another for use against ants in houses, are described.

The Mantispidæ of Japan, T. MIYAKE (*Jour. Col. Agr. Imp. Univ. Tokyo, 2 (1910), No. 3, pp. 213–221, pl. 1*).—All of the 5 species known from Japan belong to the genus Mantispa. Three of these are new to science and 1 is new to Japan.

A further contribution towards the knowledge of the Panorpidæ of Japan, T. MIYAKE (*Jour. Col. Agr. Imp. Univ. Tokyo, 2 (1910), No. 3, pp. 183–205, pl. 1, fig. 1*).—Nine species are here described as new, making a total of 36 species of Panorpidæ known to occur in Japan.

Some insects injurious to truck crops (*U. S. Dept. Agr., Bur. Ent. Bul. 82, pt. 6, pp. 67–84, figs. 5*).—This contains two papers.

Notes on the cucumber beetles, F. H. Chittenden (pp. 67–75).—This paper presents notes on 5 species of beetles of the genus Diabrotica. The saddled cucumber beetle (*D. connexa*) has been found to attack cucurbitaceous plants at Corpus Christi, Tex., and has been commonly met with in western Texas. The painted cucumber beetle (*D. picticornis*) has been found at San Antonio, Tex., attacking okra, beets, vetch, horse beans, squash, and cotton. The belted cucumber beetle (*D. balteata*) attacks wheat in Mexico and occurs in great numbers on beans, corn, and okra, especially in the blossoms, and on cucumbers and other plants at several points in southern Texas. The western 12-spotted cucumber beetle (*D. soror*) is recorded from California as a source of injury to beets, melon, cucumber, squash, beans, corn, and other vegetables; the beetle is described and notes are given on its life history and habits with records of injury. The western striped cucumber beetle (*D. trivittata*) which is common throughout the State of California and extending into Oregon is said to injure beans, cucumbers, squash, and the silk of corn in the vicinity of Salem, Oreg., and melons at Imperial Junction, Cal.

Biologic notes on species of Diabrotica in southern Texas, H. O. Marsh (pp. 76–84).—Four species are considered in this paper. *D. picticornis* was observed to attack the blossoms and foliage of cucurbits at Brownsville, Tex., in May and June of 1908. *D. balteata* is stated to be active during the year in southern Texas and by far the most injurious and common Diabrotica in the lower Rio Grande valley. Notes are given on its food plants, character of injury, occurrence, and life history. Eggs deposited in May hatched in 9 days, the larval stage requiring 25 days and the pupal stage 11 days. Experiments conducted and here reported indicate that arsenate of lead is an excellent remedy. *D. vittata* is usually rare in southern Texas (as compared with *D. balteata*) and its injuries are confined to cucurbits. It was found that eggs deposited early in May hatched in 8 days, that the larval stage required 14 days and the pupal stage 5 days, making a total of 27 days for development from egg to adult. *D. duodecimpunctata* occurs only in small numbers in southern Texas. Eggs deposited in May hatched in 6 days, 15 days were passed in the larval stage and 6 days in the pupal stage.

Animal enemies of the sugar beet, O. FALLADA (*Osterr. Ungar. Ztschr. Zuckerindus. u. Landw., 39 (1910), No. 1, pp. 37–42*).—Notes on the insects injuring sugar beets in Austria-Hungary during 1909.

Some enemies of rhododendron, A. NAUMANN (*Jahresber. Ver. Angew. Bot., 9 (1909), pp. 171–188, pl. 1, figs. 2*).—The author notes the occurrence of the greenhouse white fly, *Acalla schalleriana azaleana*, and *Otiorhynchus sulcatus* on rhododendrons in the vicinity of Dresden.

Rules and regulations for carrying out the provisions of the insecticide act of 1910 (*U. S. Dept. Agr., Office Sec. Circ. 34, pp. 14*).—The rules and regulations here promulgated relate to "the collection and examination of specimens of insecticides, Paris greens, lead arsenates, and fungicides manufactured or offered for sale in the District of Columbia or in any territory of the United States, or which shall be offered for sale in unbroken packages in any State other than that in which they shall have been respectively manufactured or produced, or which shall be received from any foreign country or intended for shipment to any foreign country, or which may be submitted for examination by the director of the experiment station or any State, territory, or the District of Columbia (acting under the Secretary of Agriculture), or at any domestic or foreign port through which such product is offered for interstate commerce or for export or import between the United States and any foreign port or country."

The text of the act is appended.

The use of insecticides in Hawaii, D. T. FULLAWAY (*Hawaii Sta. Press Bul. 27, pp. 8*).—A revision of Bulletin 3 previously noted (E. S. R., 14, p. 989).

Grease banding of fruit trees, F. V. THEOBALD (*Jour. Bd. Agr. [London], 17 (1910), No. 7, pp. 542–552*).—Experiments and observations made during a period of 6 years are here reported upon.

"Of the 3 classes of greases experimented with, namely, (a) yellow and white, (b) the black German moth glues or raupenleims, and (c) greases of birdlime type, or tanglefoot, it was found that the first dries too quickly, the second has a low catching power, but that the third lasts 'tacky' for well over the period of attack, and by moving it with a piece of wood, is at the end of 10 to even 15 months nearly as 'tacky' as before. The black greases do not seem to attract insects to the same extent as the white and yellow and shiny or birdlime preparations."

FOODS—HUMAN NUTRITION.

Studies of poultry from the farm to the consumer, MARY E. PENNINGTON (*U. S. Dept. Agr., Bur. Chem. Circ. 64, pp. 42, figs. 9*).—A review of scientific work on this subject is included, together with a statement of the industrial application of refrigeration to the handling of dressed poultry and eggs, based on a study of existing conditions, and a discussion of the application of scientific data so far obtained to industrial uses. Chilling poultry, containers for shipping poultry, poultry refrigerator cars and other matters of transportation, refrigeration in the market, and the refrigeration of eggs are among the topics considered. In connection with the discussion of refrigerator cars a number of thermograph records are presented.

According to the author, "it is a comparatively simple matter to keep birds in good condition from one season of production to the next in a well-constructed cold storage warehouse, provided those birds are received at the warehouse properly dressed, chilled, and packed, and with such promptness that decomposition has not obtained even a slight foothold. Under such conditious the responsibility of the warehouse is the maintenance of cleanliness and a constant temperature which is not above 15° F. (−9° C.), and which preferably should be nearer 10° F. (−12° C.). If, on the other hand, the poultry is not properly prepared for storage, or if decomposition has begun (even though it may be scarcely perceptible to any of the senses), it is impossible with the lowest temperatures obtainable to prevent deterioration.

"Poultry, even in the best condition, is not improved by being kept frozen for any length of time. About the sixth month of carrying, a careful observer, judging by the taste alone, can tell the difference between frozen poultry and that which is freshly killed. Up to nine months, however, this difference is so slight that it is of scarcely more than scientific interest. But after nine months, though undoubtedly the flesh is wholesome and nutritious, there is a loss in flavor the degree of which is dependent upon the length of time for which the storage has been continued.

"The thawing of the frozen chicken preparatory to its use as food is a matter of great importance if the good qualities of the fowl are to be preserved. It was formerly customary to thaw birds by throwing them into cold water. This method, on a commercial scale, is practically certain to result in thawing in dirty water, thereby so contaminating the flesh that decomposition proceeds very rapidly. It is also deleterious, in that it extracts a considerable part of the flavor of the flesh. This being the first attribute of the fresh chicken to be lost by cold storage is the one which should be most carefully guarded. To preserve it, as well as the appearance of the fowl, thawing should be accomplished by hanging the bird in cool air, if possible at the temperature of an ordinary ice refrigerator for 24 hours. This time is sufficient to thaw a bird of the usual size. A slightly longer period may be required for large roasting chickens."

As regards eggs, the author states that the length of time they can be kept in cold storage depends very largely upon their condition when they enter it. "Eggs laid early in the season during cool weather keep best. Carefully graded, packed, and transported, such eggs are good food at the end of nine months. It is likely that they will not soft boil or poach with entire satisfaction at the expiration of that period, but for all the other methods of cooking they are available. If the eggs are of strictly first quality when they enter storage they will soft boil after six or seven months and compare satisfactorily with the 'strictly fresh' eggs of the market."

The author is decidedly of the opinion that the results of scientific investigation are of great importance in the industrial use of refrigeration, and discusses this matter at some length.

Beef, its quality and classification, L. VILLIAN (*Rec. Méd. Vét., 86 (1909), No. 23, pp. 799–812, figs. 6; 87 (1910), No. 1, pp. 26–32*).—Information is given regarding French methods of cutting meat in connection with discussions of quality and grading.

The chemical composition of a number of samples of bread made from whole grain, H. KALNING (*Ztschr. Gesam. Getreidew., 2 (1910), No. 7, pp. 167–169*).—Analyses are reported and discussed.

Edible beans from the East Africa Protectorate (*Bul. Imp. Inst.* [*So. Kensington*], *8* (*1910*), *No. 3, pp. 252–261*).—Analyses of a number of samples of beans are reported and discussed. In most cases the east African beans examined agreed closely in composition with well known leguminous seeds already on the market.

Maple sirup, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 214, pp. 13*).—Of the 138 samples of maple sirup collected in Canada, 117 were found to be genuine, 4 doubtful, and 17 adulterated.

According to the author, "it is certain that although many genuine samples of sirup are of such a character as to admit of their dilution with cane sugar sirup, and still fall within such limits as to pass for genuine, the great majority of fraudulent samples will be clearly indicated while genuine maple sirup is quite safe from being adjudged as other than it is."

Contribution on jelly making, Nellie E. Goldthwaite (*Jour. Indus. and Engin. Chem.*, *2* (*1910*), *No. 11, pp. 457–462, fig. 1*).—Tests were made with apple and quince juice and with the juices from such small fruits as currants, raspberries, strawberries, blackberries, blueberries, and cherries, the results in general strengthening the conclusions drawn from the author's earlier work (E. S. R., 21, p. 461). Tests were also made of the jelly-making qualities of orange juice, and with the whole fruit, the whole skins, and the inner and outer portion of the skin of oranges, under different conditions. Some tests were also made with lemons.

According to the author's summary, "in what is usually a waste product (the white inner skins of oranges and lemons) we have an abundant source of pectin from which excellent jelly can be made if properly acidified. . . .

"It was noteworthy that the purest pectin yet prepared in this research was obtained from oranges and lemons. It was isolated . . . and was reprecipitated three times. By long manipulation of the precipitated pectin (supported on a very fine cloth suspended from the corners) the liquid was so completely worked out of the substance that a powdery white body, somewhat starch-like in appearance, was obtained. This was dried in a current of dry hydrogen over sulphuric acid.

"Ash determinations of orange pectin so obtained showed less than 0.5 per cent of ash—of lemon pectin about 3.5 per cent. . . . No melting point of this pectin could be obtained, but the substance, when out of contact with air, chars strongly at 170° C. It is hoped to continue this work on the isolation and examination of pure pectin."

The report also contains a number of interesting deductions regarding successful jelly making from the housekeeper's standpoint.

Recipes for tomatoes, peppers, and cucumbers, Carrie B. Hyde (*Winthrop Norm. and Indus. Col. S. C. Bul.*, *3* (*1910*), *No. 6, pp. 14*).—A number of recipes for utilizing these materials are given.

Solubility of copper in preserved vegetables, A. Behre (*Ber. Chem. Untersuch. Amt. Chemnitz, 1909, p. 36; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl.*, *20* (*1910*), *No. 10, p. 655*).—Artificial digestion work was undertaken to determine whether the proteid copper compound present in preserved spinach was soluble in gastric juice. Copper could not be directly identified in the filtered liquid, but about one-half of that originally present was recovered in the material after evaporation and incineration.

The solubility of zinc electroplate in lemonade and citric acid solutions, H. E. Barnard and H. E. Bishop (*Ann. Rpt. Bd. Health Ind.*, *27* (*1908*), *pp. 254–256*).—Experiments were undertaken to determine the amount of zinc dissolved when lemonade and citric acid solutions were kept for varying lengths of time in galvanized iron receptacles.

The results showed that the citric acid solutions were much more active than the lemon solutions, though their acid flavor was about the same. The length of time the solution was in contact with the container also exercised a marked effect, much more of the zinc being dissolved on the second and third day than on the first. Considering both lemonade and citric acid solutions, a range was noted of from 0.0815 gm. zinc sulphate per 100 cc. in the case of a sample of lemonade kept in a container 24 hours to 3.032 gm. in the case of lemonade in contact with the container for 72 hours. "As the dose of zinc citrate runs from 0.2 to 0.8 gm., it is evident that a person drinking an ordinary 'schooner' of this lemonade would be taking into his system a very large dose of this salt."

The state board of health accordingly issued a rule forbidding the use of zinc-coated metal containers in the manufacture and storage of acid drinks.

Concerning preservatives, A. J. J. VANDEVELDE and H. P. WIJSMAN (*Chem. Weekbl., 7 (1910), No. 26, pp. 573–587*).—A summary and digest of data.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 649, pp. 4; 651–653, pp. 2 each; 654–655, p. 1 each; 656, pp. 2; 657, p. 1; 658–660, pp. 2 each; 661, pp. 5; 662, pp. 2; 663–668, p. 1 each; 669, pp. 2; 670–672, p. 1 each; 675–678, p. 1 each; 679, pp. 2; 681, pp. 2; 682, p. 1; 683, pp. 2; 684, p. 1; 685, pp. 2; 686–687, p. 1 each; 688–690, pp. 2 each*).—These notices of judgment have to do with the adulteration of olives, ice cream cones and ice cream clams, canned tomatoes, catsup, fish, desiccated egg product, macaroni, "crystal eggs," and desiccated eggs; the misbranding of cheese, egg macaroni and egg noodles, olive oil, pepper, molasses, coffee, lemon flavoring, and vinegar; and the adulteration and misbranding of vinegar, lemon flavor, vanilla flavor, vanilla, orange, and lemon flavoring extracts, vanilla flavoring powder, calcium acid phosphate, eggs, brandy, and "Yando egg noodles."

The bacterial condition of protected and unprotected foods at restaurants, meat markets, grocery stores, bakeshops, and fruit stores, H. E. BARNARD (*Ann. Rpt. Bd. Health Ind., 27 (1908), pp. 517–523, pls. 4*).—From his experimental work the author concludes that foods kept in glass cases were in every case practically free from dust and accompanying bacteria, while food on exposed tables and racks was surrounded by air heavily laden with dirt and bacterial life. It was also shown that cleanliness of floors and utensils lessened to a certain extent the number of bacteria present, and that on the contrary counters and stands near sidewalks are always surrounded with atmospheric dust and dirt.

The author's studies were concerned chiefly with the relative number of bacteria found on the culture plates inoculated under different conditions and the types of bacteria were not thoroughly differentiated. "But there can be no doubt that they were varied and included both harmless and injurious forms, originating in the manure of the streets, the spittle from diseased lungs and nasal passages, and in every other form of the waste products of men and animals."

[Diet in a students' boarding home, University of Minnesota], P. R. KELLAR (*Cooking Club Mag., 12 (1910), No. 11, pp. 10, 11*).—Information is briefly summarized regarding food at the college commons, University of Minnesota, where the author states that board is supplied at 22 cts. per man per day. [From the data given regarding typical menus for breakfast, dinner, and supper, it was calculated that the food supplied 105 gm. protein and 3,715 calories of energy per person per day.]

Dietary studies of undernourished school children in New York City, E. M. SILL (*Jour. Amer. Med. Assoc., 55 (1910), No. 22, pp. 1886–1891*).—The author briefly reports the results of 28 studies of families with malnourished children in the thickly congested districts of New York City and of 6 studies made with fairly well-to-do families.

In the first group the average cost of the food was 19 cts. per man per day. It supplied 95 gm. protein, 68 gm. fat, and 407 gm. carbohydrates, the fuel value being 2,614 calories. The author states that these families were engaged in active or moderately active work.

"Some six of these dietaries were up to or above the recognized standards, and therefore raised the general average considerably, but most of the dietaries were considerably below the ordinary standard, few being up to 3,000 per man per day and some as low as 1,600 calories per man per day, with corresponding low fat, proteid, and carbohydrates, thus showing the undernourished condition due to lack of proper food.

"In those families whose dietaries were up to or above the standard there were always other good and sufficient reasons for the malnutrition of the children, such as close quarters, overcrowding, late hours, infrequent bathing, eating candy between meals, and tuberculous infection, or convalescence from disease; also adenoids and enlarged tonsils in some cases, or organic disease."

In the fairly well-to-do families the food on an average cost 35 cts. per person per day, and supplied 149 gm. protein, 115 gm. fat, and 569 gm. carbohydrates, the fuel value being 3,884 calories. These families were engaged in moderately active work. The author points out that these quantities were adequate, and the adult members were well nourished. This was not the case with the children, and he attributes their malnutrition "to the fact that they ate cheap candy between meals and thereby spoiled their appetites for nourishing food, lived in crowded quarters, sat up late at night, had organic disease, or were convalescing from disease. All of these were good reasons for their condition."

Considering all of the dietary studies, the results showed that 61 per cent of the total expenditure was for animal foods, and 39 per cent for vegetable foods, about the same amount of protein being obtained from the one group as from the other. Detailed suggestions are made for improving the diet.

According to the author's general conclusions, the "improper and unscientific feeding of children from the time of birth to maturity is one of the most fruitful causes, both directly and indirectly, of disease, disability, incapacity for work, both mental and physical, loss of energy, susceptibility to contract and inability to withstand disease. . . . This paper, however, deals with the child after the stage of babyhood has passed; in other words, the school child, up to the age of 10 or 12 years.

"My experience has been in treating hundreds of these children that they contract disease much more easily and have less power of resistance than well-nourished children, and when disease is contracted it is apt to be more severe and prolonged."

The author believes that efforts should be made to spread information regarding food and nutrition topics.

The paper is followed by a discussion.

Some facts concerning certain undernourished children, FRANCES PERKINS (*Survey, 25 (1910), No. 1, pp. 68–72*).—The effects of food and other conditions were studied with 107 undernourished children in a public school in New York City.

According to the author's summary, "physical disabilities of one kind and another are closely associated with malnutrition, and make it doubly dangerous.

"In many cases the money spent on food is not spent to the best advantage from the point of view of nutritive value, and this is chiefly due to ignorance.

"Actual underfeeding due to lack of income is the chief cause of malnutrition. To the low wages paid to workingmen may be attributed the real reason for the underfeeding of children which so seriously menaces the vitality of the next generation."

The diet of Japanese farmers, R. INABA (*Mitt. Med. Gesell. Tokio, 21 (1907), No. 21, pp. 1–88*).—Diet in rural regions in Japan is discussed and the results of 14 dietary studies are reported.

In the first 7 studies the principal food was a mixture of rice and barley and in the remaining studies, rice, these materials being supplemented by soy bean products and similar food materials. The barley and rice diet supplied per man per day 125.89 gm. protein, 31.57 gm. fat, and 663.40 gm. carbohydrates, the energy value being 3,529 calories. The rice diet supplied on an average 77.79 gm. protein, 16.92 gm. fat, and 530.46 gm. carbohydrates, the energy value being 2,676 calories. Considering all the studies together, the daily foods supplied on an average 101.88 gm. protein, 24.24 gm. fat, and 597.36 gm. carbohydrates, the energy value being 3,091 calories. On an average less than half the protein and about one-eleventh of the carbohydrates of the diet were supplied by the foods other than rice or rice and barley. The diet supplied on an average 55.90 calories per kilogram of body weight or 1,678 calories per square meter of surface area.

According to the author's results, the coefficients of digestibility for the rice and barley diet were protein 69.6 per cent, fat 62.91 per cent, and carbohydrates 98.83 per cent; and for the rice diet protein 77.27 per cent, fat 72.73 per cent, and carbohydrates 99.44 per cent.

Detailed studies of the urine are also reported.

The author's conclusions were in effect as follows:

It may be inferred from the facts reported that the farmers' families studied lived almost entirely on vegetable foods. However, they select, arrange, and cook their food in such a manner as to make it palatable and digestible. Although the supply of protein is not sufficient to meet the requirements of Voit's dietary standard, and fat is also limited, yet the farmers carry on hard labor and secure sufficient energy, mainly in the form of carbohydrates, to compensate for the consumption of body substance. Thus, they spare protein and at the same time become fat, and attain to a strong physical development. Furthermore, the nearly equal apportionment of food for the several daily meals keeps the digestive organs from overwork and diminishes the possibility of digestive and metabolic disturbances. Their diet, however, is by no means an ideal one and it is hoped that by increasing the amount of animal food it may be brought up to perfection. This can not be easily realized under the present economic conditions in Japan. It is necessary, therefore, to encourage cattle farming as a part of agriculture in order to increase the supply of animal food and to decrease the cost of such food.

The article is supplemented by an extended bibliography containing a large number of references to literature published in Japanese.

[The Japanese victory in Manchuria and vegetarianism], J. J. MATIGNON (*Rev. Sci. [Paris], 48 (1910), II, No. 9, pp. 265–269*).—In his discussion the author summarizes data regarding the ration of the Japanese troops in Manchuria and directs attention to the relatively large amount of meat and other animal food which it contained.

The cost of living, R. LUCE ET AL. (*Boston, 1910, pp. 752, dgms. 6*).—This report, made by the Massachusetts Commission on the Cost of Living, comprises the results of an exhaustive study of living conditions, including such topics as price statistics, wages and hours of labor, chief items of expenditure, social and individual wastage, changes in supply and demand, and changes in the value of money. The question of changes in supply includes among other matters the effect on cost of living of transportation facilities, advertising, adulteration of foods, package goods, and short weights.

In the appendix are summarized data on public markets in Boston, family budgets, food prices in Canada and the United States, statistics of agriculture in Massachusetts, statistics of meat supply, comparative expenditures at state institutions, and other topics.

Some quotations from the findings of the commission follow:

"The advance of prices in the United States has been accelerated greatly by the enormous waste of income, through uneconomic expenditure for war and national armament and through multiple forms of extravagance, both public and private, and of wastage, both individual and social. The increasing burden of disease, accident, crime, and pauperism imposed upon society, and the loss through expenditure on a rising scale for luxuries and through wasteful methods of management in the household, have been potent contributing factors to the advance of the cost of living.

"The advance of prices has been further promoted by a complexity of causes, operating on the side of supply to reduce the volume and increase the expenses of production, and on the side of demand to extend and diversify the consumption of commodities. The main factors in restricting supply and enhancing the cost of commodities are the drain of population from the land, which has decreased the proportion of persons engaged in producing the food supply; the exhaustion of natural resources, which has resulted in increased expenses of production or diminished returns from the soil; and uneconomic methods of production and distribution, especially the latter. The chief influences on the side of demand which have worked parallel to the forces affecting supply are the growing concentration of population in great cities, which has increased the proportion of nonproducing food consumers; the general advance of the standard of living, which has enlarged the requirements on the part of individual consumers of all classes; and the national habit of extravagance, which has further extended and diversified the demand for comforts and luxuries created by the advance of the standard of living."

As a result of its investigation, the commission made a number of recommendations with special reference to conditions in Massachusetts.

Standard and cost of living [of cotton mill operatives in Switzerland and Italy], S. L. Besso (In *The Cotton Industry in Switzerland, Vorarlberg, and Italy. Manchester and London, 1910, pp. 79–84; 193–195*).—Information is summarized regarding the kinds and amounts of food eaten, the dietary habits, the cost of food, and other similar topics, the data being discussed in comparison with conditions prevailing in England. The investigation of which this forms a part was undertaken by the Victoria University of Manchester, England, as a part of a series of studies of industry and commerce.

The composition of East Indian food material, J. E. Q. Bosz (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 12, pp. 747–756*).—Continuing the study of East Indian food materials, previously noted (E. S. R., 22, p. 665), the author reports analyses of a large number of food materials, including cereal grains and cereal products, beans and other legumes, nuts, tropical fruits and other fruits, vegetables, spices, turtle eggs and eggs of poultry, edible birds' nests, meat, fish, dairy products and many other food materials.

The nutritive value of some soluble pentosans, mannans, levulans and galactans, Mary D. Swartz (*Proc. Amer. Soc. Biol. Chem., 1 (1910), No. 5, pp. 257, 258*).—Studies were made of the fate in the animal body of certain water-soluble hemicelluloses, obtained from marine algæ and similar substances.

They were found to be very resistant to the action of animal and vegetable enzyms. Experiments showed that galactans were not affected by the ordinary aerobic bacteria of the alimentary tract, or by mixtures of soil and fecal aerobes, of soil and fecal anaerobes, or of powerful putrefactive organisms such as *Bacillus anthracis symptomatici* and *B. maligni oedematis.* Pentosans, mannans, and levulans were found to be gradually decomposed by soil and fecal bacteria and by putrefactive anaerobes, sometimes with the formation of reducing substances.

"When introduced parenterally, either subcutaneously or intravenously, they are not retained or altered by the organism, but are gradually excreted in the urine. Feeding experiments on dogs and human subjects show that those hemicelluloses most readily attacked by bacteria disappear most completely from the alimentary tract. Galactans, which are unaffected to any appreciable extent, are excreted in amounts averaging 75 per cent; pentosans and mannans, hydrolyzed by bacteria, disappear almost entirely during the processes of digestion.

"It is manifestly impossible to treat of the digestibility of hemicelluloses as a class; each group must be studied separately, and distinctions made also between soluble and insoluble forms.

"The experiments give little justification for considering these carbohydrates as typical nutrients for man."

The influence of cooking upon the tryptic digestion of milk, H. STASSANO and J. TALARICO (*Compt. Rend. Soc. Biol.* [*Paris*], *69* (*1910*), *No. 28, pp. 251–253*).—Artificial digestion experiments are reported with milk cooked for different lengths of time at 100° C.

The digestibility was at first considerably increased and then again decreased to about the value observed with raw milk. Similar ranges were noted with samples cooked at higher and lower temperatures as compared with 100°. For earlier work see a previous note (E. S. R., 23, p. 374).

The influence of sour milk on metabolism, V. HARLEY (*Brit. Med. Jour., 1910, No. 2603, pp. 1588–1593*).—Experiments are reported in which sour milk was added to a simple diet. Food, urine, and feces were analyzed.

According to the author's conclusions, the amount of aromatic sulphates in the urine was decreased a little and the feces tended to become neutral or acid in reaction. Apparently, there was a decrease in intestinal putrefaction when sour milk was taken, but the analytical data reported show that small quantities of sour milk added to an ordinary diet do not seem to bring about any improved absorption of the food.

The paper is followed by a discussion.

The limitations of curdled milk therapy, A. BRYCE (*Brit. Med. Jour., 1910, No. 2603, pp. 1586–1588*).—From his summary of data the author draws some deductions of general interest.

"It is absolutely certain," he states, "that there is no indication for the indiscriminate and widespread use of curdled milk as a therapeutic agency. If the practice of moderation in eating be the keynote of the whole life, if a daily alvine evacuation be the rule—and this is by no means the prerogative of vegetarians—then we can afford to despise the much advertised ravages of the putrefactive organisms in the colon."

The metabolism of some purin compounds in the rabbit, dog, pig, and man, L. B. MENDEL and J. F. LYMAN (*Jour. Biol. Chem., 8* (*1910*), *No. 2, pp. 115–143*).—Experiments with men and animals are reported.

In the experiments with man hypoxanthin nitrate, xanthin, guanin, and adenin were added on different days to a purin-free diet. According to the authors, the examination of the urine showed that all four purins produced a marked rise in urinary uric acid and a small, yet noticeable increase in the elimination of purin bases. The smaller and lighter of the two subjects excreted, in every case, a larger percentage of uric acid and purin bases than the other subject, and, according to the authors, "may possess a more limited power for uric acid destruction."

The effect of meat purins (largely free hypoxanthin), on the elimination of purin compounds is illustrated by data cited from a series of experiments by Hilditch, also made at Yale University, in which meat was substituted for the milk and eggs of a purin-free diet. The resulting increase in the excretion of uric acid nitrogen, it is stated, is quite comparable with the figures obtained in the experiment with pure hypoxanthin.

In discussing their work in comparison with that of earlier investigators, the authors point out that the data which they report "emphasize the fact that all of the familiar purins may lead to an increase in exogenous uric acid in the urine of man, with (quantitatively) little influence on the elimination of the purin bases. They may be interpreted to support the most prevalent view that uric acid is a stage in the metabolism of exogenous purins in the human body, a view rendered especially plausible by the growing statistics on tissue enzyms. The inequalities in the quantitative aspects of this uric acid production are striking, a far larger proportion of uric acid being eliminated after ingestion of hypoxanthin and xanthin than after the amino purins. We may call attention to the absence of any further metabolic disturbance associated with the introduction of the purins in the doses used. They did not act conspicuously as diuretics. The absence of any marked perversion of nitrogenous metabolism and the uniformity of the conditions observed is attested by the constancy of some of the urinary features, notably the endogenous creatinin elimination, and the figures for ammonia nitrogen and phosphorus. . . .

"It will be noted in our protocols that an increased output of uric acid was attained just as well by feeding pure hypoxanthin as through the agency of the extract of meat with its hypothetical 'toxins.'"

The effect of muscular work upon animal organs, particularly their water content, H. Gerhartz (*Pflüger's Arch. Physiol., 133 (1910), No. 7-10, pp. 397-499, dgm. 1*).—According to the author's conclusions, from experiments with dogs, muscular work increases the renal excretion and consequently the excretion of sodium chlorid and water. The heat produced by muscular work is chiefly eliminated by the evaporation of water, only about one-fourth leaving the body by radiation and convection. Under the experimental conditions, the water taken after work did not fully compensate for that excreted, so that the organism had a lower water content as a result of work. Increased dry matter content is the principal characteristic of muscle hypertrophy due to muscular work. Other conclusions are also presented.

The influence of mental and muscular work on nutritive processes, F. G. Benedict (*Proc. Amer. Phil. Soc., 49 (1910), No. 195, pp. 145-163, figs. 3*).—The experiments summarized have been reported in a bulletin of the Office of Experiment Stations (E. S. R., 21, p. 68).

ANIMAL PRODUCTION.

Investigations on the utilization of ammonium salts and the nonprotein nitrogen compounds of feeding stuffs, A. Morgen, C. Beger, and F. Westhausser (*Landw. Vers. Stat., 73 (1910), No. 4-5, pp. 285-394*).—These investigations were continued with some slight modifications along the lines previously noted (E. S. R., 21, p. 666). Analyses are given of the basal rations, which consisted of hay, dried beet chips, and straw, supplemented at times by dried slop, starch, sugar, and peanut oil.

Experiments in milk production were made with milch goats and sheep. In one test ammonium acetate was used as a supplement to the normal ration, and in another test it was used as a substitute for the pure protein part of the ration. In other tests amid extracts were used, the ration always containing the same amount of pure protein as the basal ration, but the amount of crude protein varying according to the nature of the source of the extract. The average milk production when a change was made from the normal ration is given in the following table:

Average yields of milk and milk solids and percentage of milk fat with different rations as compared with yields on a normal ration.

Ration.	Yield of milk.	Yield of dry matter.	Yield of nitrogen.	Yield of fat.	Relative percentage of fat.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Ammonium acetate as a supplement	97.3	96.0	95.2	97.1	99.4
Ammonium acetate as a substitute	69.6	67.8	67.6	67.2	97.8
Amid extract of grass	92.6	91.8	87.0	102.2	113.0
Amid extract of beet chips	89.9	87.3	83.7	89.7	100.4
Amid extract of malt sprouts	96.4	92.8	88.7	98.2	102.1

The highest yield of milk and its constituents was obtained from the basal ration except in a few cases, where the substitute ration gave slightly higher percentages of fat. The addition of ammonium acetate to the basal ration did not materially decrease the yield, but when the protein of the basal ration was largely replaced by ammonium acetate the yield was decreased as in former experiments. The form of carbohydrate did not affect the values of ammonium acetate. There was no appreciable effect on the live weight of the animals. The introduction of amid extracts decreased the yield slightly but somewhat less than in previous years. Ammonium acetate as a supplement was without effect upon the valuation of nitrogen metabolism, as in the case of substitution. During the amid extract period there was a larger amount of protein in the feces than in the normal ration. A substitution of ammonium acetate caused no increase of protein in the feces; hence, the formation of so-called indigestible bacterial protein out of ammonium acetate, as formerly suggested, was not substantiated. The average coefficients of digestibility of rations are given in the following table:

Average coefficients of digestibility of rations.

Ration.	Dry matter.	Crude protein.	Pure protein.	Fat.	Nitrogen-free extract.	Fiber.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Basal ration	69.0	85.7	85.1	77.1	80.5	48.0
Ammonium acetate supplement	69.9	90.5	85.0	72.4	79.7	46.2
Ammonium acetate as a substitute	66.7	85.4	67.0	76.9	77.3	44.5
Amid extract of grass	66.4	80.8	78.4	81.1	75.4	51.9
Amid extract of beet chips	66.5	82.3	81.3	73.0	77.7	47.9

In metabolism experiments with wethers on similar rations the nitrogen balance showed a daily loss of 3 gm. of nitrogen during the period of feeding straw and ammonium acetate. On adding a small amount of distillery slop this was reduced to 1.78 gm., and to 0.29 gm. by adding a large amount of slop. The favorable effect of the slop showed that the straw was poorly digested without it. The depression was due to a lack of protein in the straw. The excess of nitrogen in the feces was due to products of metabolism and not to bacteria.

The general conclusions drawn from the entire series of experiments are that an excess of protein in the feces is due to indigestible protein of amid extracts and products of metabolism, and that ammonium salts can be substituted in part for pure protein both for maintenance and for milk production. The smaller the protein content of the feces, the higher is the feeding value of the ammonium salt.

Horse chestnuts as a feeding stuff, M. KLING (*Landw. Vers. Stat., 73 (1910), No. 6, pp. 397–424*).—The fresh horse chestnuts consisted of 82.61 per cent kernel and 17.39 per cent shell. Chemical analysis showed that the kernel of the fresh nut was made up of water 50.6 per cent, protein 3.99 per cent, fat 3.47 per cent, nitrogen-free extract 39.64 per cent, fiber 1.24 per cent, and ash 1.06 per cent. The husk contained water 52.63 per cent, protein 1.70 per cent, fat 0.11 per cent, nitrogen-free extract 34.80 per cent, fiber 10.25 per cent, and ash 0.51 per cent. The air-dried kernel contained 14.20 per cent of water and the air-dried husk 13.99 per cent.

The article contains a review of investigations in feeding horse chestnuts, and a bibliography of the subject is appended.

[Soy cake v. linseed cake], W. BRUCE (*Edinb. and East Scot. Col. Agr. Bul. 21, pp. 15, charts 2; Irish Farming World, 23 (1910), Nos. 1181, pp. 1034, 1035; 1182, p. 1060*).—Experiments were carried out on 2 different farms under the auspices of the Edinburgh and East of Scotland College of Agriculture.

In the first experiment 2-year-old Irish bullocks were fed for 121 days on a basal ration of linseed cake, Swede turnips, oat straw, and hay. With linseed meal as a supplement the cost of gains in live weight per hundred were £1 16s. 4d.; with soy-bean cake containing 6 per cent oil £1 18s. 1½d.; and with compound soy-bean cake £1 19s. 1¾d. In an experiment on another farm the gains per hundredweight were with linseed £2 1s. 7d.; with soy-bean cake containing 6 per cent of oil £1 17s. 3d.; and with soy-bean cake containing 11 per cent of oil £2 3d. When linseed cake was fed as a supplement to home-bred cattle the corresponding gains cost £2 2s. 8d.

The conclusion drawn is that at £6 15s. per ton soy-bean cake is a more expensive feeding stuff than good linseed cake at £9 per ton. The poorer in oil the better the results.

Chemical analysis of fodder plants in southwest Africa, C. GRIMME (*Jahrb. Deut. Landw. Gesell., 25 (1910), No. 3, pp. 658, 659*).—The grasses and other forage plants which were analyzed included the following: *Cynodon dactylon, Aristida uniplumis, Andropogon contortus, Acacia hereroen, Peltophorum africanum, Croton gratissimus, Flueggea obovata, Combretum primigenium, Nidorella auriculata, Tribulus pechuelii, Tamarix articulata, Catophractes alexandri, Tribulus terrestris, Atriplex vesicaria, Rhigozum trichotomum, Leucosphæra bainesii, Zygophyllum* sp. and *Aitonia capensis.*

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 650, pp. 12; 691, pp. 2*).—These relate to the adulteration and misbranding of "No. 3 White Oats" and the misbranding of stock feed.

Fattening cattle on beet pulp (*Pacific Rural Press, 80 (1910), No. 24, p. 480*).—Methods of fattening steers on beet pulp and straw hay or alfalfa are described.

Economical beef production, H. R. SMITH (*Nebraska Sta. Bul. 116, pp. 52, figs. 15*).—A series of experiments is reported on the economy of beef production as affected by the food and by the individuality of the animal.

In feeding supplements to corn in rations for steers, 2-year-old grade Shorthorns and Herefords weighing about 1,150 lbs. each were fed for 8 weeks on a basal ration of corn and prairie hay. The average gains per head and day on the different supplements were as follows: On bran 1.98 lbs., at a cost of 9.31 cts. per pound, on linseed meal 2.52 lbs., at a cost of 7.87 cts. per pound, on cotton-seed meal 2.29 lbs., at a cost of 8.59 cts. per pound, and on alfalfa hay 2.29 lbs., at a cost of 7.4 cts. per pound.

In a second test, lasting 20 weeks, with 2-year-old grade Angus weighing about 975 lbs. each, the basal ration consisted of corn and unshredded corn stover. The average gains per head and day with the different supplements were as follows: On bran 1.76 lbs., at a cost of 10.49 cts. per pound, on linseed meal 2.33 lbs., at a cost of 7.64 cts. per pound, on cotton-seed meal 2.11 lbs., at a cost of 8.26 cts. per pound, and on alfalfa hay 2.42 lbs., at a cost of 6.99 cts. per pound.

A further test was made with 2-year-old grade Shorthorn steers that were given a basal ration of corn and corn stover. In 12 weeks the average gains per head and day with the different rations were as follows: On bran 2.53 lbs., at a cost of 9.24 cts. per pound, on linseed meal 2.43 lbs., at a cost of 9.64 cts. per pound, on cold pressed cotton-seed cake 2.8 lbs., at a cost of 8.29 cts. per pound, and on alfalfa hay 2.55 lbs., at a cost of 8.77 cts. per pound. The alfalfa lot gave the largest percentage of dressed weight and the carcasses were appraised higher than those of the other lots. These experiments show conclusively that in Nebraska a combination of corn and alfalfa is the best and most economical ration for beef production.

A feeding test was then undertaken to determine the most economical proportion of corn and alfalfa, with the following results: On a heavy feed of corn, and of alfalfa hay and corn stover in equal parts as a roughage, the average daily gain per head was 2.42 lbs. at a cost of 6.78 cts. per pound. Corresponding figures on a light feed of corn, and with alfalfa and stover in the proportions of 6:4, were 2.01 lbs. at a cost of 6.51 cts. On a heavy feed of corn, and with alfalfa and stover 4.5:5.5, the gain was 2.55 lbs. at a cost of 8.77 cts. per pound. On a medium feed of corn, with alfalfa and stover 5.5:4.5, the gain was 2.34 lbs. at a cost of 8.76 cts. per pound. On a light feed of corn, with alfalfa and stover 6:4, the gain was 2.08 lbs. at a cost of 8.03 cts. per pound. On a heavy corn ration, with alfalfa as the only roughage, the gain was 2.73 lbs., at a cost of 8.62 cts. per pound, on a medium corn ration and alfalfa 2.86 lbs., at a cost of 7.76 cts. per pound, and on a light corn and alfalfa ration 2.71 lbs., at a cost of 6.95 cts. per pound. The groups fed the medium and heavy grain rations dressed practically the same, with a slight difference in favor of the medium group. Those fed the light grain ration dressed somewhat light because of their lower condition.

These experiments were made in different years and the price of feeds varied somewhat, but from the entire series it is concluded "that with corn above 35 cts. per bushel and with alfalfa not to exceed $7 per ton, the old method of fattening cattle for market, namely, that of crowding with grain and using but little roughage, is much less profitable than a more moderate use of grain and correspondingly more roughage. Not to exceed three-fourths of a full feed of corn and a correspondingly larger quantity of alfalfa will give practically the same daily gains."

In order to study individuality, the records of each group were kept separately and the results as presented in tabular form show a great variation in the capacity of individuals to make gains under similar conditions. "Nearly all of the largest gainers of both experiments were steers which measured large middle girths at the beginning of the feeding period, and it would seem that size of middle girth is an important factor in determining future gains. In these experiments the size of bone did not seem to bear any definite relationship to rate of gain, some of the best gainers being large in bone and some relatively small; nor was there any definite relationship between heart girths and rate of gain, though the large majority of the best doers of the several groups were large in heart girth. With but few exceptions the best gainers showed more pliability and softness of skin."

Hog feeding experiments, J. C. BURNS (*Texas Sta. Bul. 131, pp. 7–33, figs. 14*).—A series of 4 experiments in feeding hogs is reported.

Blackstrap molasses was compared with corn for fattening hogs. In a 90-day test with 24 large improved Yorkshires, 8 to 10 months of age, the average daily gains per head and day for the different rations were as follows: On corn chop and molasses 1:1, 0.9 lb. at a cost of 10.75 cts. per pound; on corn chop and molasses 3:1. 1.45 lbs. at a cost of 7.53 cts.; and on corn chops alone 1.66 lbs., at a cost of 7.36 cts. per pound. Another lot of 8 was turned on a Spanish peanut patch for a time and later transferred to a dry lot and fed skim milk and the same amount of corn chop as the previous lot, and on this ration made in 63 days an average daily gain of 2.19 lbs. at a cost of 6.71 cts. per pound.

Grade Poland-Chinas were compared with scrub stock (razor backs) in a feeding test lasting 144 days. The razor backs on a ration of corn chop, rice bran, and tankage in the proportions of 4:4:1 made an average daily gain per head of 0.98 lb., at a cost of 6.02 cts. per pound. The best animals of the grade Poland-Chinas on the same ration made an average daily gain of 1.31 lbs., at a cost of 5.94 cts. per pound. The superiority of the Poland-Chinas was evident, as to make 100 lbs. gain the razor backs ate 205.6 lbs. of corn chops, 205.6 lbs. of rice bran, and 44.2 lbs. of tankage, while the Poland-Chinas in making the same gain ate 202.5 lbs. of corn chops, 202.5 lbs. of rice bran, and 43.8 lbs. of tankage. The Poland-Chinas suffered a greater loss than the razor backs during transportation to the Fort Worth stockyards. The average of the weights taken at College Station and at Fort Worth would show that there was practically no difference between the 2 lots as to the cost of making 100 lbs. gain, but the Poland-Chinas sold for 65 cts. per hundredweight more than the razor backs. Excluding the cost of labor and expense of shipment the profit derived from each hog in the razor back lot was only 15 cts., while that from the Poland-China lot was $1.63.

In a feeding test with 18 Poland-Chinas during a period of 91 days a lot fed a ration of corn chop made an average daily gain per head of 0.21 lb., at a cost of 14.49 cts. per pound. The corresponding gains for a lot on rice bran was 0.73 lb., at a cost of 3.84 cts. per pound, and for a third lot on Spanish peanuts 0.67 lb., at a cost of 13.46 cts. per pound. The rations were then changed for the same lots of pigs during a period of 39 days. The first lot on corn chops, rice bran, and tankage in the proportion of 4:4:1 made an average daily gain per head of 1.06 lbs., at a cost of 3.15 cts. per pound. The corresponding figures for the second lot fed corn chops and rice bran 1:1 were 1.24 lbs., at a cost of 3.37 cts. per pound, and for the third lot fed corn chops and Spanish peanuts 1:1, 1.58 lbs., at a cost of 4.76 cts, per pound.

"Rice bran was much cheaper than corn and yielded a larger gain. The pork produced by it was of an inferior quality to that produced by corn. The shrinkage from the dressed weight hot to the dressed weight chilled was much greater and the percentage of dressed carcass much less. Rice bran should be used more extensively in pork production when corn is so much higher in price, and, for the best results, should be fed in connection with feed rich in protein. Spanish peanuts fed alone yielded a larger gain than corn fed alone. The results indicated that an acre of peanuts of a yield of 40 bu. would produce approximately $18.40 worth of pork at $6.25 per 100 lbs. With pork at $9 per 100 lbs. the same acre would produce $26.64 worth. Peanuts and corn combined produced much more rapid gains than peanuts alone. The quality of the pork produced by peanuts was much inferior to that produced by corn."

Analyses are given of corn chops, rice bran, tankage, peanut kernel, peanut hull, and the entire peanut.

Yearbook of scientific and practical animal breeding, edited by G. Wilsdorf and R. Müller (*Jahrb. Wiss. u. Prakt. Tierzucht, 5 (1910), pp. V+392, figs. 35*).—Part 1 of this yearbook contains original articles by Bosch, Hilzheimer, Macalik, and Schöttler (noted below). Part 2 consists, as usual, of abstracts of current literature on zootechny. Part 3, which is a new feature, includes brief notes by breeders concerning their observations and experiences connected with practical breeding operations.

Recent works in the literature of animal breeding, H. Kraemer (*Mitt. Deut. Landw. Gesell., 25 (1910), Nos. 26, pp. 403–407; 32, pp. 477–480; 45, pp. 653–656*).—A review of a number of important publications relating to animal industry which have recently appeared in the German, French, English, and Scandinavian languages.

Evolution, biological and human, F. Sacco (*L'Évolution Biologique et Humaine. Turin and Paris, 1910, pp. VIII+430, pl. 1*).—A synthetical account of the evolution of the higher forms of plants and animals from lower types during the succession of geological epochs, including both organic and psychic human evolution.

The sociological and political significance of heredity and selection, W. Schallmayer (*Vererbung und Auslese in ihrer Soziologischen und Politischen Bedeutung. Jena, 1910, 2. ed., rev. and enl., pp. XVIII+463, figs. 10*).—This book summarizes the results obtained by investigations of biologists concerning variation, heredity, and selection. The necessity of profiting by this information in the improvement of man as well as other animals is pointed out. There are numerous references to the literature on the subject.

Modern study of heredity, A. Gallardo (*Las Investigaciones Modernes sobre la Herencia en Biologia. Cordoba, 1909, pp. 72; rev. in Jour. Roy. Micros. Soc. [London], 1910, No. 5, pp. 557*).—A review of recent work on heredity, with particular reference to biometry and Mendelian studies.

The crisis of transformism, F. Le Dantec (*La Crise du Transformisme. Paris, 1909, pp. VI+292; rev. in Ztschr. Induktive Abstam. u. Vererbungslehre, 4 (1910), No. 2, pp. 144, 145*).—In this book the mutation theory of species is criticised, and the author advocates the use of chemical terms in describing biological phenomena in order to avoid ambiguity.

The Mendelian theory of heredity and the augmentation of vigor, A. B. Bruce (*Science, n. ser., 32 (1910), No. 827, pp. 627, 628*).—Assuming that dominance is positively correlated with vigor, the author offers a mathematical demonstration to show that the crossing of two pure breeds produces a mean vigor greater than the collective mean vigor of the parent breeds, and that the inbreeding of a Mendelian population leads to a decrease in the mean number of elements of the types (DD) and (DR).

The significance of the correlation coefficient when applied to Mendelian distributions, J. Brownlee (*Proc. Roy. Soc. Edinb., 30 (1909–10), No. 6, pp. 473–507*).—Investigations are reported of the conditions under which the Mendelian theory is capable of accounting for the facts concerning the transmission of characters from parent to offspring. The various factors which influence correlation, such as (1) the influence of different methods of calculating correlation of coefficients, (2) assortive mating, (3) correlation coefficients when more than 2 races mix, are treated mathematically. The results obtained are applied to the work of Karl Pearson on the inheritance of coat color in horses, cattle, and greyhounds.

The arithmetic of the product moment method of calculating the coefficient of correlation, J. A. HARRIS (*Amer. Nat., 44 (1910), No. 527, pp. 693–699*).—A short method is described which consists in taking for y arrays of variates O instead of the grade thought to be nearest the mean origin. In this way the total for the array may be obtained by adding the products of the frequencies by their grades. By multiplying up by the grade of x character $S(x'y')$ is then at once obtained.

Inheritance of color and of supernumerary mammæ in guinea pigs, with a note on the occurrence of a dwarf form, IGERNA B. J. SOLLAS (*Rpts. to Evolution Com. Roy. Soc. [London], 1909, No. 5, pp. 51–79, pl. 1, figs. 2; abs. in Ztschr. Induktive Abstam. u. Vererbungslehre, 4 (1910), No. 2, p. 155*).—A report of 5 years' experiments with guinea pigs, in which the characters studied were pigmentation, dwarfness, and supernumerary mammæ.

Albinism was found to be recessive to the fully colored forms. The other color factors were G, ticking of the hairs; B, black pigment in the eye and skin; R, red pigment in the hair, and red and chocolate pigment in the skin and eye; and Ch, chocolate pigment in the hair, skin, and eye. These colored forms fall into 2 series, a dark-eyed series and a ruby-eyed one, according as the factor for black pigment is present or absent. Each of these forms may exist in a dilute condition, and such dilute forms behave as recessive to the corresponding form with intense pigmentation.

A peculiar dwarf form appeared which was remarkable in the shortness of the body and limbs and the unusual form of the head. No offspring were obtained. The proportions in the families where they occurred, 74 normals to 25 dwarfs, point to the condition as being recessive. Four-fifths of the dwarfs were males.

Supernumerary mammæ were present in both sexes. More than one additional pair were never observed, and in many cases an additional mamma was present on one side only. The heredity of this character resembles that of the extra toe in guinea pigs and poultry, in apparently showing neither dominance nor recession. Thus, normal offspring of abnormal parents may give some abormal young.

Sex-limited inheritance, P. B. HADLEY (*Science, n. ser., 32 (1910), No. 831, p. 797*).—This is a note concerning numerous crosses of poultry made at the Rhode Island Station in 1892, which illustrates sex-limited inheritance.

In the Indian Game-Plymouth Rock crosses the cockerels were between Indian Game and Plymouth Rock in shape. The combs resembled those of the Indian Games and the plumage that of the Plymouth Rocks. The pullets were black and more like the Indian Games in shape.

Investigations on the cause of hair whorl in domesticated animals, with special reference to the forehead "star" and its practical significance for judging live stock, E. BOSCH (*Untersuchungen über die Ursache der Haarwirbelbildung bei den Haustieren mit besonderer Berücksichtigung des Gesichtswirbels und dessen praktische Bedeutung für Beurteilung, Leistung und Zucht der Haustiere. Inaug Diss., Univ. Bern, 1910, pp. 55, figs. 4; Jahrb. Wiss. u. Prakt. Tierzucht, 5 (1910), pp. 94–140, figs 4*.—The prevalence of many maxims among breeders concerning the hair whorls as a sign of a good breeding animal has led the author to study minutely the anatomy and physiology of the hair and surrounding tissues and the development of the hair and hair follicles in the embryo.

As a result the author finds that the position and size of the whorl on the forehead is dependent upon the movements of the ears, eyes, nose, and lips and the texture and thickness of the skin. He has illustrated the action of the different muscles by stretching a sheet of rubber perforated with pins over the skull of the horse. A pull from any portion of such a sheet will alter the longitudinal axis of the pins.

Reasoning from analogy, the author believes that the position of the hair whorl will depend upon the part of the head which has the best development of muscles. A horse with a well developed nervous system will have an active movement of the eye and ear muscles, while large respiratory organs will necessitate a strong musculature about the nose. Therefore, it is argued that a conspicuous facial whorl signifies a highly bred animal with a nervous temperament. The author also ventures to draw other conclusions regarding hair whorls as indications of an animal of superior qualifications.

A bibliography is appended.

Who has seen a European wild ox? M. Hilzheimer (*Jahrb. Wiss. u. Prakt. Tierzucht, 5 (1910), pp. 42–93, figs. 17*).—A discussion of the characteristics of *Bos primigenius*, which inhabited Europe within historic times, as described or depicted by different authors and observers both ancient and modern.

The Augsburg painting of the wild ox is considered to be the best representation made in the Middle Ages, while the pictures in Herberstain's Travels can not be true to life, although Herberstain's account of *B. primigenius* is an important document in furnishing evidence that the species in the wild form lived in the sixteenth century. The author finds no substantial evidence that any wild form of *B. longifrons* lived in eastern Europe.

A bibliography is appended.

Morphological-microscopical study of sheep's wool as a help in judging the purity of the breed of sheep, B. Macalik (*Jahrb. Wiss. u. Prakt. Tierzucht, 5 (1910), pp. 141–153, figs. 12*).—This article contains discussions, measurements, and micro-photographs of wool hairs, of pure-bred sheep of the Balkan States and crosses of these with the Rambouillet and Merino breeds. The value of using the microscope in studying the strength of the wool fiber and in classifying wool and related problems is pointed out.

Growth measurements of horses, F. Schöttler (*Jahrb. Wiss. u. Prakt. Tierzucht, 5 (1910), pp. 1–41*).—Measurements were made of different lots of horses in the Province of Hanover, those of one lot of 48 horses being as follows: At 6 months of age, circumference of cannon bone 15.75 cm., height of withers 131.04 cm., girth 135.81 cm.; at 1 year of age, circumference of cannon bone 16.73 cm., height at withers 139.83 cm., girth 146.83 cm.; at 1½ years of age, circumference of cannon bone 23.81 cm., height at withers 147.58 cm., girth 167.1 cm.

The author found that the cannon bone on the right foreleg was generally larger than that on the left. Several other conclusions are also drawn, and a bibliography on the subject is appended.

Lord Morton's quagga hybrid and origin of dun horses, J. Wilson (*Nature [London], 84 (1910), No. 2133, p. 328; Vet. Rec., 23 (1910), No. 1159, pp. 189, 190*).—Because the author thinks that a chestnut mare could not produce a bay offspring, he has some doubts about the ancestry of the famous quagga hybrid of Lord Morton. It is further stated that the dun color in horses is not a reversion.

[Lord Morton's quagga hybrid and origin of dun horses], J. C. Ewart (*Nature [London], 84 (1910), No. 2133, p. 328; Vet. Rec., 23 (1910), No. 1159, pp. 189, 190*).—This is an answer to the objections raised by Wilson in the article noted above.

It is pointed out that the prevailing color of all the wild Equidæ now living in Asia is dun. Crosses between varieties of Burchell's zebras with white points and crosses between zebras and ponies have usually dark patches at the fetlocks, and the body color of zebra-horse hybrids is usually yellow, rufous, or leather-dun, so it may be assumed that the remote ancestors of the modern zebras only differed in their coat color from Prejvalsky's horse in being more richly striped. It is also stated that there are 2 kinds of duns, first, those without either a dorsal band, shoulder or leg stripes, and, second, those with the band and as a rule with more or less distinct bars on the legs.

"Yellow-duns with a dorsal band and at least vestiges of leg bars are in all probability either the descendants of a long line of dun ancestors or are reversions. . . . That dun is latent in some bays and blacks was proved recently by a black Shetland mare from Unst producing to a bay Arab (Insaf), with a dorsal band and leg bars, a richly striped yellow-dun."

"A light chestnut Iceland pony mare in my stud produced a bay-dun with dark points to a yellow-dun Prejvalsky stallion, and a richly striped yellow-dun Highland mare produced first a dark bay with dark points and then a light bay (also with dark points) to a chestnut thoroughbred (Diplomat). I am, hence, not surprised that Lord Morton's chestnut Arab produced a filly of a bay or bay-dun color to a quagga."

"My crossing experiments do not support the view that chestnut never contains bay or that yellow-dun is always dominant with chestnut, bay, brown, and black. They, on the whole, support the view that characters are 'patent' or 'latent' rather than, as Mendelians say, 'present' or 'absent.'"

Lord Morton's quagga hybrid and origin of dun horses, J. WILSON and J. C. EWART (*Nature [London], 84 (1910), No. 2138, pp. 494, 495*).—A further discussion in support of the contentions noted above.

The inheritance of dun coat color in the horse, J. B. ROBERTSON (*Vet. Rec., 23 (1910), No. 1161, pp. 225–228*).—Data were obtained from Weatherby's studbook and the early Racing Calendars with reference to the dominance of dun, but are not sufficient from which to draw definite conclusions.

History and peculiarities of the mule-foot hog, W. J. SPILLMAN (*Amer. Breeders Mag., 1 (1910), No. 3, pp. 178–182, figs. 3*).—This contains further details concerning the history and characteristics of this breed (E. S. R., 22, p. 379).

Investigations on the origin and historical development of the bulldog and pug-faced animals, B. POETTING (*Untersuchungen über die Entstehung und die historische Entwicklung der Bulldogge und des Mopses. Inaug. Diss., Univ. Bern, 1909, pp. 33, pls. 7; rev. in Arch. Rassen u. Gesell. Biol., 7 (1910), No. 4, pp. 498, 499*).—The author finds that under domestication there is a tendency for the facial parts of all domesticated animals to become shortened because the teeth are used less than when in a wild state, where any tendency of this kind would not survive long enough for the individual to breed. The changes in the teeth and other portions of the skull correlated with short-headedness are discussed.

Report of committee on animal hybrids, W. J. SPILLMAN ET AL. (*Amer. Breeders Mag., 1 (1910), No. 3, pp. 193–196*).—This contains an account of the work in animal hybridization now in progress at the experiment stations and elsewhere in the United States.

Problems of animal morphology, G. C. BOURNE (*Science, n. ser., 32 (1910), No. 830, pp. 729–742*).—An address before the zoological section of the British Association for the Advancement of Science in 1910.

It is pointed out that in the past the study of animal form has placed the evolutionary theory on a sound basis, but that if morphology is to advance in the future the work must be so broadened as to study the causes which produce changes in the animal body. The ground is taken that investigations show that external conditions modify the germ cell and that such modifications are probably inherited. It is suggested that the characters segregated during segmentation may in some way be identified with the enzyms in the germ cell.

The relation of nucleoli to chromosomes, H. E. Jordan (*Arch. Zellforsch.*, *5* (*1910*), *No. 3*, *pp. 394–405*, *figs. 9*).—In studies of Echinoderms the author finds that the chromotin substance of chromosomes appears to arise from the nucleolus by a process of budding and dispersing. Evidence obtained by other observers is also cited which does not support the hypothesis of the morphological individuality of the chromosome.

The process of fertilization and other cytological problems, B. Němec (*Das Problem der Befruchtungsvorgänge und andere Zytologische Fragen. Berlin, 1910, pp. 532, pls. 5, figs. 119*).—Among the many problems connected with nuclear union and division treated in this book are the following: Microchemistry of the nucleus, effect of chloroform, plasmolysis, and other factors on nuclear and cell division, individuality of the chromosomes, relation between the nucleus and size of the cell, chromosome reduction, and the nucleus as the carrier of the idioplasm. In the transmission of characters from cell to cell and from generation to generation, the author ascribes less influence to the nucleus than do many other investigators.

An extensive bibliography is appended.

Three examples of duplicity in chick embryos with a case of ovum in ovo, C. H. O'Donoghue (*Anat. Anz.*, *37* (*1910*), *No. 20*, *pp. 530–536*, *figs. 4*).—Two cases of syncephalic monsters, one a case of independent embryos in the same egg, and a case of an egg within an egg, are illustrated and described. The literature relating to similar cases is cited.

[The anatomy of the sex organs of hermaphrodites] (*Nature* [*London*], *85* (*1910*), *No. 2140*, *p. 19*).—A note on some ancient museum specimens of the sex organs of cattle and poultry.

Live stock and farming fifty years ago (*Live Stock Jour.* [*London*], *70* (*1909*), *No. 1864*, *pp. 671, 672*; *71* (*1910*), *Nos. 1867*, *pp. 31, 32*; *1868*, *p. 55*).—An account of the live stock industry gleaned from visits to Scotland, the Cotswold Hills, and Suffolk and Essex counties, in the early sixties.

Cooperative live stock insurance, E. A. Stopford (*Jour. Bd. Agr.* [*London*], *17* (*1910*), *No. 8*, *pp. 643–649*).—A summary of the principles on which cooperative live stock insurance in the continental countries of Europe is organized.

Safety and comfort of stock in transportation (*Breeder's Gaz.*, *58* (*1910*), *No. 21*, *pp. 1079, 1080*, *figs. 3*).—A discussion of the causes of shrinkage in live stock transportation. A new type of live stock car, which has many humanitarian features, is illustrated and described.

Regulations governing the certification of recognized breeds and pure bred animals (*U. S. Dept. Agr., Bur. Anim. Indus. Order 175*, *pp. 6*).—These regulations apply to animals imported into the United States for breeding purposes. There is also a list of recognized breeds and books of record in Canada and Europe.

Live stock commercial literature, C. S. Plumb (*Breeder's Gaz.*, *58* (*1910*), *No. 22*, *pp. 1136, 1137*).—A discussion of the live stock sale catalogue, in which it is pointed out that if the pedigrees and other data which these catalogues contain should be accurately compiled they would serve as valuable reference books for breeders to keep on file.

Factors concerned in the acclimatization of European animals in Algeria and warm countries (*Bul. Agr. Algérie et Tunisie*, *16* (*1910*), *No. 17*, *pp. 413–418*).—A brief account of the buffalo, zebu, and French breeds of cattle which have been introduced into Algeria.

The essential factors in the acclimatization of European live stock at Tonkin, E. Douarche (*Agr. Prat. Pays Chauds*, *10* (*1910*), *No. 91*, *pp. 271–*

290).—A general discussion of this topic, with a brief report of the success already obtained with the importation of live stock from Europe and Australia.

Longhorn cattle (*Country Life* [*London*], *28* (*1910*), *No. 724*, *pp. 727–729*, *figs. 6*).—An account of the interest recently taken in England in this breed, including a description of the desirable points of a modern type of Longhorn.

Cattle in Central America, J. E. Downing (*Breeder's Gaz.*, *58* (*1910*), *No. 19*, *pp. 961*, *962*, *figs. 3*).—An account of the unsatisfactory condition of the cattle industry in Central American countries because of poor stock, inadequate methods of handling, Texas fever and other pests, and unstable conditions of government.

Cattle breeding in Sweden, A. Richardsen (*Landw. Jahrb.*, *39* (*1910*), *No. 4–5*, *pp. 623–774*, *pls. 9*, *fig. 1*).—A report of a study of the cattle industry of Sweden by a German professor of agriculture. The principal topics discussed are characteristics of breeds, feeding and management, yields of milk and milk fat, control unions, methods of registering pure breeds, and official measures for the improvement of cattle breeding. Comparisons are drawn between cattle breeding in Sweden and Germany.

Cattle breeding in the German colonies, Schilling (*Tropenpflanzer*, *14* (*1910*), *No. 11*, *pp. 555–566*).—An account of progress made in the adaptation of European breeds of live stock to the conditions which exist in the colonial possessions of the German Empire.

Contribution to the study of bovine races in the lower basin of the Yangtze, Patrigeon (*Bul. Soc. Cent. Méd. Vét.*, *87* (*1910*), *No. 14*, *pp. 298–300*).—A brief report on cattle breeding in that region. The native cattle consist of zebus and buffaloes. Durhams, Ayrshires, Jerseys, and other breeds have been imported from Europe, Australia, and America.

Conformation and selection of cavalry horses, G. Barrier (*Rec. Méd. Vét.*, *87* (*1910*), *No. 13*, *pp. 441–459*).—This is a report to the Hippological Congress in June, 1910, in which the desirable points of cavalry horses are discussed.

The Fort Reno remount station, W. C. Short (*Jour. U. S. Cavalry Assoc.*, *21* (*1910*), *No. 81*, *pp. 399–403*).—An account of the methods of training cavalry and artillery horses at this station.

Endurance races, E. D. Thomas (*Jour. U. S. Cavalry Assoc.*, *21* (*1910*), *No. 81*, *pp. 444–462*).—An account of an endurance test of horses in the saddle and buggy. The characters desired for an ideal cavalry horse for the United States Army are also discussed.

Prevention of damage to hides, skins, and wool (*Jour. Bd. Agr.* [*London*], *17* (*1910*), *No. 8*, *pp. 620–628*).—A discussion of the causes and means of prevention of damage to hides by the warble fly, sheep scab and other parasites, the tar branding of sheep, sheep dips, dirty condition of animals, and improper methods of flaying.

Dalgety's annual wool review for Australasia (*Dalgety's Ann. Wool Rev. Austral.*, *1909–10*, *pp. 63*, *charts 5*).—This is the usual annual review, containing statistics and discussions of the production, exportation, and value of the wool clip of Australia, Tasmania, and New Zealand for the season 1909–10, which has exceeded that of any previous year both in quantity and quality.

Animal breeding (*Jahresber. Landw. Königr. Sachs.*, *1909*, *pp. 161–198*).—This contains the live-stock statistics of the Kingdom of Saxony for the year 1909. There was a slight decrease in the number of cattle, sheep, and goats, and an increase in horses and swine.

The business hen, H. W. Collingwood (*New York*, *1910*, *pp. 192*, *figs. 46*).—A practical book on breeding, hatching, raising, and handling poultry for egg production. Several chapters have been contributed by station officials.

Experiments with ostriches, J. E. Duerden (*Agr. Jour. Cape Good Hope, 35 (1909), Nos. 4, pp. 474–487; 5, pp. 600–603; 6, pp. 687–692; 36 (1910), No. 1, pp. 27–32; 37 (1910), No. 2, pp. 133–138, pls. 3, figs. 12*).—This is a continuation of articles previously noted (E. S. R., 21, p. 473). The topics discussed are acclimatization of ostriches, principles of ostrich breeding, structure and nutrition of the green feather, cause of bars, cause of weakness and density of flue, and the influence of nutrition, season, and quilling on the feather crop.

DAIRY FARMING—DAIRYING.

Milk records of Allgau cows, 1894–1909 (*Molk. Ztg. Berlin, 20 (1910), Nos. 48, pp. 567, 568; 50, pp. 590, 591*).—The milk production of 3,000 registered cows of the Allgau breed ranged from 1,238 to 6,008 kg. per year. The average yield for 16 years was 3,113 kg. of milk, containing 3.64 per cent of fat.

As a rule, the highest yields occurred in the fifth and sixth lactation periods and when the cows freshened in the winter months. A high yield usually was accompanied by a decrease in the percentage of fat. Age did not appear to affect the fat content to any appreciable extent. There seemed to be a correlation between form and function, as the heavy milkers scored high when judged according to the usual "milk signs."

Report of the cow-testing associations in Lolland-Falster County, 1908–9, C. P. Skov (*Ber. Kontrolfor. Virks. Lolland-Falsters Stift, 1908–9, pp. 58*).—Average data for the year for the production and feed consumption of 750 herds, aggregating 17,263 cows, with summaries, are given in the report.

Report of the cow-testing associations in Malmöhus County, 1909–10, J. Nilsson (*Malmö. Läns Hushåll. Sällsk. Kvrtlsskr., 1910, No. 3, pp. 403–518*).—Data for 154 associations, including 2,398 herds and 47,659 cows in the aggregate, are given for the year 1909–10, with summary figures for 10-year periods in the case of 5 of the associations.

Report of the fifth 2-years' competition for dairy herds in Funen County, 1907–8, N. A. Ove and P. A. Mörkeberg (*Ber. To-Aar. Konkur. Hele Kvæghold, Fyns Stift, 5 [1907–8], pp. VII+256, pls. 42*).—The object of the competition, which was restricted to herds of the red Danish breed of cows in Funen County, was to discover the herds from the side of both breeding and production that would be of most value in the improvement of the general dairy herds of the county.

The cows in the best herd averaged 9,016 Danish pounds of milk (about 9,917 lbs. avoirdupois), containing 3.77 per cent of fat. Descriptions of the methods of management and the history of the competing herds and of the breeding of the animals are given.

The dairy industry in the State of Sao Paulo, J. Arthaud-Berthet and A. Perrièr (*Bol. Inst. Agron. [São Paulo], 1909, No. 11, pp. 289–295*).—A brief statistical account of the progress in dairying, which is slow in spite of the natural advantages of soil and climate.

Dairy industry developing in Russia, J. H. Snodgrass (*Daily Cons. and Trade Rpts. [U. S.], 13 (1910), No. 150, pp. 1193–1198*).—An account of the growth of the dairy industry in Siberia, European Russia, and Finland.

Because of the form of land tenure creameries have sprung up in all sections where there are adequate transportation facilities. In Siberia there are now 1,868 creameries, about 30 per cent of which are managed by artels (union associations). In 1909, 124,416,000 lbs. of butter was exported from West Siberia, an eightfold increase during the past 10 years. In Finland there is an Export Association of Dairy Farmers, which owns about 100 dairies and which exports annually to England $1,500,000 worth of butter.

First century of dairying in New South Wales, F. McCaffrey (*Sydney, 1909, pp. 336, figs. 128*).—A popular work on dairying, with a historical account of the development of dairying in Australia but more particularly in New South Wales. The author has gleaned considerable material from records and newspapers concerning the introduction of pure breeds in the early days in Australia.

[Literature on dairying for 1909], M. Müller (*Jahresber. Landw., 24 (1909), pp. 375–396*).—This contains brief reviews of leading articles on dairying which appeared in the German language during the year.

Report of the attorney general in the matter of the milk investigation, E. R. O'Malley (*Albany, N. Y., 1910, pp. 329*).—This consists of testimony of experts concerning the cost of producing and distributing the milk supply of cities, which was obtained during an investigation of an alleged milk trust.

State or municipal control? G. M. Whitaker (*Amer. Food Jour., 5 (1910), No. 12, pp. 28–36, fig. 1*).—A lecture before the meeting of the Association of State and National Food and Dairy Departments at New Orleans, November 30, 1910.

The advantages and disadvantages of both municipal and State control over milk and dairy products are discussed, and the author, although having reached no positive opinion, is favorably inclined to the view that the general principles governing the production and distribution should be fixed by the State legislature but that the administration of such laws must remain, in part at least, in the hands of the municipalities. "Possibly, however, the final and best solution of the problem would be along the line of cooperation of State and municipality, with the State in the last analysis responsible for results and having supervisory powers over the cities that are not up to the State standard, but allowing any municipality to take steps in advance of that if it wishes to do so."

Cooperative milk depot in England, C. R. Loop (*Daily Cons. and Trade Rpts. [U. S.], 13 (1910), No. 150, pp. 1200, 1201*).—An account of a large cooperative society recently organized in Wiltshire for the purpose of buying milk and disposing of it as milk, butter, and cheese.

[Graded milk and cream], V. E. Fuller (*Pract. Dairyman, 4 (1910), No 17, pp. 193, 195*).—In addition to other matters connected with a farm where sanitary milk is produced, there is an account of the method of grading the quality and fixing the price of milk. Besides the general milk which is supposed to come within the law, there are the grades designated as "baby" milk, containing 4 per cent of fat, 2 grades of "children's" milk, containing $4\frac{1}{2}$ and 5 per cent of fat, respectively, and "special" milk, containing 6 per cent of fat. Cream is graded as light, heavy, and special.

Milk and cream, raw and pasteurized, E. Gudeman (*Amer. Food Jour., 5 (1910), No. 12, pp. 88–91*).—A paper read before the National Association of Ice Cream Manufacturers at Atlantic City, November 17, 1910, on standards for milk and cream and on the doubtful benefit of pasteurization. From his own experience the author concludes that sterilizing is a better safeguard than pasteurizing.

Experiments in sterilizing sweet milk and cream at from 120 to 130° C., N. O. Hofman-Bang, H. P. Lunde, and P. V. F. Petersen-Landmack (*Ber. K. Vet. og Landbohöjskoles Lab. Landökonom. Forsög [Copenhagen], 71 (1910), pp. 5–21, figs. 4; N. Y. Produce Rev. and Amer. Cream., 31 (1910), No. 3, pp. 104, 105*).—A sterilizing apparatus is illustrated and described, for which the claim was made that with it milk and cream can be heated to 120 to 130° C. without injuring their quality or that of butter made from cream heated to this temperature.

After experiments with the apparatus the authors report that the apparatus furnished milk in practically germ-free condition and that it did not give a cooked taste to the milk. Butter made from sterilized cream was not of better quality nor did it keep better than common pasteurized butter. The yield of butter was about 3 per cent less, the water content of the butter slightly lower, and the percentage of fat in the buttermilk somewhat higher than with the common Danish pasteurizing apparatus.

Standards for evaporated milk, sweetened condensed milk and condensed skim milk.—Federal and State dairy laws, O. F. HUNZIKER (*Indiana Sta. Bul. 143, popular ed., pp. 15, fig. 1*).—A popular edition of a bulletin previously noted (E. S. R., 23, p. 778).

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 673, 674, 680, p. 1 each*).—These relate to the adulteration of milk.

Testing cream for butter fat, O. F. HUNZIKER (*Indiana Sta. Bul. 145, popular ed., pp. 22, figs. 16*).—A popular edition of the bulletin previously noted (E. S. R., 24, p. 77).

The influence of soy-bean cakes on the quality of butter, L. F. ROSENGREN (*Meddel. Centralanst. Försöksv. Jordbruksområdet, No. 30, pp. 8*).—Soy-bean cakes fed to milch cows at the rate of 2.5 kg. per head a day did not cause any undesirable flavors in the milk or butter.

Report on the Irish butter industry, J. R. CAMPBELL ET AL. (*Dept. Agr. and Tech. Instr. Ireland, Rpt. Dept. Com. Irish Butter Indus., 1910, pp. 35+XI+604*).—This is a report of a committee appointed to inquire into and interpret the principal forms of trade descriptions at present applied in the United Kingdom, and to suggest any additional measures, if desirable, for the department to take in the interests of the Irish butter industry.

Trade definitions are given of butter, creamery butter, dairy butter, and factory butter. Minutes of evidence taken before the committee are reported in full. Appendixes contain data on dairying in other countries, statistics on the cost of butter production, prices realized from butter, and other data.

Butter substitutes, W. P. CUTLER (*Amer. Food Jour., 5 (1910), No. 12, pp. 36–44*).—This is an address before the Association of State and National Food and Dairy Departments at New Orleans, December 1, 1910, in which the legislation relative to oleomargarine, adulterated butter, and process or renovated butter is discussed.

Acidity in cheese making, trans. by J. H. MONRAD (*Dairy, 22 (1910), Nos. 263, p. 293; 246, pp. 321, 322*).—A translation of a portion of an article by O. Jensen on the influence of acidity in the manufacture of Emmental cheese. Comments of the translator are also given to show the significance of acidity in the manufacture of Cheddar cheese.

The production of volatile fatty acids and esters in Cheddar cheese and their relation to the development of flavor, S. K. SUZUKI, E. G. HASTINGS, and E. B. HART (*Jour. Biol. Chem., 7 (1910), No. 6, pp. 431–458*).—Previously noted from another source (E. S. R., 23, p. 679).

The cheese of Loiret and Loir-et-Cher, A. ROLET (*Laiterie, 20 (1910), No. 22, pp. 169–171*).—An account of the growth of the cheese industry in these departments, with details of the methods of making Olivet, Thenay, and Vendôme cheeses.

On paraffining of cheese, L. F. ROSENGREN (*K. Landtbr. Akad. Handl. och Tidskr., 49 (1910), No. 6, pp. 490–507, figs. 4; Meddel. Centralanst. Försöksv. Jordbruksområdet, No. 28, pp. 20, figs. 4; Milch Ztg., 39 (1910), Nos. 49, pp. 579–581; 50, pp. 589–592, figs. 4*).—Extensive experiments were made with paraffining 4 different kinds of Swedish hard cheeses and of Gouda and Cheddar cheese manufactured at the Alnarp dairy school. The cheeses were kept in the curing room for varying periods up to 8 months, and the relative quality and losses of the paraffined and unparaffined lots determined.

The results show that the loss in curing Cheddar cheeses was only 1.7 per cent in the case of the paraffined cheese (at 5 months), against about 16 per cent for the unparaffined Cheddar (Stilton form), and from 10 to 12 per cent for Cheddars weighing from 25 to 35 kg. (at a curing temperature of 10 to 15° C.) For the Swedish cheese the losses in curing amounted to 5.8 per cent on the average for the paraffined cheese against about 14 per cent for the unparaffined cheeses. The quality of the cheese was improved by paraffining, both because of the somewhat higher moisture content and because there was less danger of undesirable flavors. On account of the thin and soft rind of paraffined cheeses they must be handled with care, especially in the early stage of ripening.

Paying for cheese milk, J. H. MONRAD (*N. Y. Produce Rev. and Amer. Cream., 30 (1910), No. 26, p. 992*).—A discussion of the work previously noted (E. S. R., 24, p. 183). The author favors paying on the basis of fat content. If a second test is used, the reduction fermentation test rather than the casein test is advocated.

[Payment for milk at cheese factories], H. ANDERSON ET AL. (*N. Y. Produce Rev. and Amer. Cream., 30 (1910), No. 26, pp. 989–991*).—A symposium on this subject by managers of cheese factories. An editorial note, after reviewing the different methods of payment discussed, indorses the system of paying by fat content alone.

[Plans of cheese factories], F. W. CULBERTSON ET AL. (*N. Y. Produce Rev. and Amer. Cream., 30 (1910), No. 25, pp. 914, 915, figs. 3*).—Three different ground plans of cheese factories are illustrated and described.

Casein production, J. H. MONRAD (*N. Y. Produce Rev. and Amer. Cream., 31 (1910), No. 1, pp. 12–14*).—An abstract of a report by Counselor O. Wennevold, of Denmark, who visited galalith factories in Germany and Denmark. Details of the process of manufacture are given. It is calculated that it takes 33 lbs. of skim milk to produce 1 lb. of dried casein with from 10 to 12 per cent of water.

"The rennet casein is used for making galalith used for combs, buttons, cigar holders, etc., and experiments are under way for making an imitation silk. The acid casein is used for glue and 'oil' for painting, but the color made is more like whitewash with glue in it than oil color for sizing of paper, etc., as well as for patent foods, such as 'laktorin,' 'galaktogen,' etc. It is claimed that the use of casein has increased 100 per cent during the last 5 years and that Germany consumes about 4,000 tons annually, while the whole consumption in Europe and America is placed at about 15,000 tons."

Studies in sheep dairying, A. BURR and F. M. BERBERICH (*Milch Ztg., 39 (1910), Nos. 39, pp. 457–459; 40, pp. 469–472*).—This is a continuation of work previously noted (E. S. R., 23, p. 582), and is a résumé of investigations on the properties and composition of sheep's milk.

Goat dairying, J. E. DOWNING (*Hoard's Dairyman, 41 (1910), No. 43, pp. 1256, 1257, figs. 2*).—An account of the milch goat industry in the United States at the present time and its possibilities for the future.

The goat, R. ESCOBAR (*Estac. Agr. Expt. Ciudad Juárez, Chihuahua, Bol. 27, pp. 85, pls. 17*).—A popular work on goats and goat breeding, with special reference to the goat as a dairy animal in Mexico. The different breeds are illustrated and described.

A model separator house, S. E. WATSON (*Town and Country Jour., 27 (1910), No. 3, pp. 16, 17, figs. 3*).—A separator house, recommended by the California State Dairy Bureau, is illustrated and briefly described.

The depreciation of dairy machinery, E. ANTZ (*Molk. Ztg.* [*Hildesheim*], *24* (*1910*), *No. 97, pp. 1823, 1824*).—Estimates are given of the depreciation of engines, boilers, separators, and other apparatus used in butter and cheese factories.

VETERINARY MEDICINE.

The prevention and treatment of diseases of the domestic animals, K. WINSLOW (*New York, 1910, pp. 303, pl. 1*).—The modern treatment of the more common diseases of domesticated animals is presented in a conveniently arranged form.

The people's home stock book, W. C. FAIR (*Cleveland, Ohio, 1910, pp. V+315, pls. 48*).—This is a popular account of diseases of domestic animals and the methods of treatment therefor.

A text-book of histology, F. R. BAILEY (*New York, 1910, 3. ed. rev., pp. XVIII+589, pl. 1, figs. 354*).—A thoroughly revised and partly rewritten edition of this work.

Manual of poisonous plants, L. H. PAMMEL (*Cedar Rapids, Iowa, 1910, pt. 1, pp. VI+150, pls. 5, figs. 42*).—This manual deals chiefly with the poisonous plants of eastern North America. Chapters are devoted, respectively, to poisons and statistics on poisons; bacterial poisons; dermatitis, forage poisoning, ergotism, and aspergillosis; poisoning from fungi; poisoning from other plants (4 chapters); poisoning from flowers, honey, and mechanical injuries; classification of poisons, symptoms, and antidotes; the production of poison in plants; algæ in water supplies; a catalogue of the more important poisonous plants of the United States and Canada; and the chemistry of alkaloids, glucosids, etc.

Further observations on the immunization of animals to the poisons in fungi, W. W. FORD (*Jour. Pharmacol. and Expt. Ther., 2* (*1910*), *No. 2, pp. 145–152*).—Continuing previous work (E. S. R., 18, p. 826; 21, p. 629), 3 different substances in fungi, the Amanita (*A. phalloides*) hemolysin, the Amanita (*A. phalloides*) toxin, and the Muscaria (*A. muscaria*) agglutinin, were tested at some length with regard to their power of stimulating animals to antibody formation.

Only one of these, the Amanita hemolysin, acts like a true toxin in this respect, and with this poison the immunization of animals has now been carried out on so many different occasions and the sera produced have such definite and lasting antihemolytic properties as to leave little doubt of the definiteness of the reaction. The fact that the author's chemical investigations indicate that this hemolysin must be classed as a glucosid, and that animals may be immunized to it after it has been freed of proteid, raises important questions in regard to immunity production, and suggests that the study of other substances than the toxic proteids may throw some light upon that remarkable phenomenon in which the tissues and cells of the animal organism throw out protective substances when certain poisons come in contact with them, but fail to react in this way under the influence of other poisons.

The principles of pathology (*Philadelphia and New York,* [*1908*], *vol. 1, pp. XVI+948, pls. 16, figs. 322; 1909, vol. 2, pp. XV+1082, pls. 15, figs. 310*).—The first volume of this work, by J. G. Adami, is devoted to general pathology; the second, by J. G. Adami and A. G. Nicholls, to systemic pathology.

A text-book on disease-producing micro-organisms especially intended for the use of veterinary students and practitioners, M. HERZOG (*Philadelphia and New York, 1910, pp. XI+644, pls. 14, figs. 214*).—This text-book is divided into four parts, namely, (1), the theory and practice of general bacteriology (pp. 17–192); (2), special bacteriology (pp. 193–449); (3), micro-organisms in foods and soils (pp. 451–527); and (4) pathogenic protozoa (pp. 529–619).

"While the book is primarily intended for veterinary students and practitioners, it is hoped that it will also be of use to the medical student who wishes to give attention to the comparative bacteriology of man and the domestic animals. It may also find a place in the curriculum of agricultural colleges where bacteriology is becoming more and more taken up, and where it is also especially studied with reference to veterinary science and to certain fermentative processes in the soil, and in milk and milk products, as butter, cheese, etc. Micro-organisms in relation to such processes have, therefore, been fully considered."

The author believes it is of great advantage to the student to have after each chapter a number of questions covering the subject treated and has included such.

Pathogenic micro-organisms, including bacteria and protozoa, W. H. PARK and ANNA W. WILLIAMS (*New York and Philadelphia, 1910, 4. ed., rev. and enl., pp. VIII+670, pls. 8, figs. 196*).—An enlarged and thoroughly revised edition of this work (E. S. R., 21, p. 579).

The disease-producing bacteria, M. LOEHLEIN (*Die Krankheiterregenden Bakterien. Leipsic, 1910, pp. VI+120, figs. 33*).—This deals with the origin, treatment, and preventive measures of the bacterial diseases of man.

Standardization of bacterins, R. T. PETTIT (*Jour. Amer. Med. Assoc., 55 (1910), No. 14, p. 1221*).—Instead of estimating the number of bacteria for injection, the author utilizes a dilution method in which a 24-hour agar culture of the bacteria is mixed with a definite amount of salt solution, centrifuged to remove the clumps, and placed in a special bottle, and the bacteria killed by heat or carbolic acid. The dilutions are then made from the stock solution or emulsion from 1 : 10 to 1 : 100. An initial dose of 5 cc. of the 1 : 100 solution is given, the dosage carried up to the 1 : 10 solution, and then to the full emulsion until a local reaction is obtained. The author terms the full emulsion 100 per cent, and the doses are recorded as 1, 2, 5, 7 cc., etc., of the 1 per cent, 10 per cent, or 100 per cent emulsion.

The advantages of the dilution method over the numerical method are as follows: (1) The reaction, the real index of dosage, is relied upon and the empirical administration of bacterins is made less possible. (2) An index of antibody production is aimed at. (3) By using this method vaccines can be prepared with much greater rapidity, "at least an hour is saved on each bacterin prepared."

The influence of extracts of Anchylostoma caninum on the coagulation of the blood and on hemolysis, L. LOEB and M. S. FLEISHER (*Jour. Infect. Diseases, 7 (1910), No. 5, pp. 625–631*).—"In the anterior part of Anchylostoma a substance is present that inhibits the coagulation of the blood; it can be preserved for a long time in a dried condition. It is not analogous to hirudin, but it seems to show some similarity to the substance inhibiting the coagulation of the blood which is present in cobra venom. It will, however, be necessary to make additional comparative tests before such a relationship can be considered proven."

Preliminary experiments on the effect of cold on various diseases of small animals, R. ROSS and C. L. WILLIAMS (*Ann. Trop. Med. and Par., 4 (1910), No. 2, pp. 225–232; abs. in Sleeping Sickness Bur.* [*London*], *Bul. 2 (1910), No. 20, pp. 327, 328*).—The senior author points out that if the conditions under which the host lives are abruptly altered the animal parasites which it harbors may be adversely affected. Though the temperature of the body is not markedly altered by the lowering of the external temperature, changes may be produced in the blood or tissues which are inimicable to the parasites. Experiments conducted are reported by the junior author.

Pathogenic spirochetosis in mammalia, R. M. Carter (*Abs. in Jour. Trop. Vet. Sci., 5 (1910), No. 3, pp. 495, 496*).—The author records the discovery of a spirochete in cavalry horses at Lucknow, India, that resemble the *Spirochæta equi* described by Theiler in South Africa.

Concerning Trypanosoma theileri and the related trypanosomes of cattle, M. Mayer (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 6 (1909), No. 1, pp. 46–51, pl. 1; abs. in Sleeping Sickness Bur.* [*London*], *Bul. 7, 1909, pp. 279, 280*).—The author doubts that *T. franki*, the species found in German catle, as previously noted (E. S. R., 21, p. 686), is pathogenic.

A contribution to the investigation of Trypanosoma evansi and methods of combating surra in horned cattle of Java, P. T. Schat (*Beiträge zu den Untersuchungen über die Trypanosoma evansi und zur Bekampfung der Surra unter dem Hornvieh auf Java. Inaug. Diss., Univ. Bern; rev. in Sleeping Sickness Bur.* [*London*], *Bul. 2 (1910), No. 15, pp. 103, 104*).—This dissertation is divided into 6 chapters: (1) Review of literature; (2) morphology and biology; (3) flies which carry surra infection; (4) pathology and pathological anatomy; (5) therapeutics; and (6) prophylaxis. A bibliography appears at the end of each.

The author has arrived at the conclusion that the chief carrier of *T. evansi* in Java is *Stomoxys calcitrans*, but that other flies (*Hæmatobia exigua*, n. sp. and *Tabanus tropicus*) may occasionally carry the surra infection. As a result of researches he thinks that direct infection from animal to animal is possible, but that the general rule requires a stage of development in the body of the fly before it can become dangerous to a healthy animal.

Piroplasmosis among cattle in the Mombera district, Nyasaland, 1909, H. S. Stannus (*Parasitology, 3 (1910), No. 3, pp. 307–311, pl. 1*).—The author describes an outbreak of piroplasmosis among cattle which occurred over a widespread area in the Mombera district during the rainy season of 1908–9, causing considerable losses in herds owned by natives. The piroplasmosis concerned appears to be a form having affinities with those recently found in Uganda and the Sudan.

A contribution to our knowledge of gall sickness, A. Theiler (*Transvaal Dept. Agr., Farmers' Bul. 111, 1910, pp. 14; Transvaal Agr. Jour., 8 (1910), No. 31, pp. 423–435*).—A detailed account of the disease caused by the parasite which the author recently described as *Anaplasma marginale* (E. S. R., 24, p. 82).

Rabies and its methods of control in New York State, J. F. DeVine (*Amer. Vet. Rev., 37 (1910), No. 5, pp. 581–596*).—A general review of practically all the aspects of the subject.

Reaction of human and bovine tubercle bacilli upon the udder of the goat, a contribution to the problem of the relation of tuberculosis in man and animals, B. Knobbe (*Ueber die Einwirkung Menschlicher und Rindertuberkelbazillen auf das Euter der Ziege, ein Beitrag zur Frage der Beziehungen zwischen der Tuberkulose des Menschen und der Tiere. Inaug. Diss., Univ. Bern, 1909, pp. 44; rev. in Milchw. Zentbl., 6 (1910), No. 9, pp. 430, 431*).—Goats' udders were injected with human and bovine tubercle bacilli. In two instances the animals succumbed after passing through the classical symptoms of tuberculosis. With 1 goat which was infected with bovine tubercle bacilli the process remained localized in the udder, while with the second animal miliary tuberculosis of the lungs developed in addition. Lambs fed with milk obtained from these animals developed a general tuberculosis of the alimentary tract and its lymph nodes. In addition, tuberculous foci were found in the lungs of these animals, and in one instance the liver showed lesions.

Human tubercle bacilli with 1 goat were found to be avirulent; in another they produced a swelling of the mammary gland with nodular formations. In the latter case, however, the process receded in a few weeks, and when the udder was sectioned nothing was found, although the lungs contained tuberculous foci. The lambs fed with the milk from this animal also showed a pronounced tuberculosis of the alimentary tract and its nodes.

This work substantiates the belief that bovine tuberculosis is more virulent than human tuberculosis.

A contribution to the knowledge of intestinal tuberculosis in cattle, F. Grüttner (*Abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 13, pp. 283, 284; Vet. Rec., 22 (1910), No. 1138, p. 711*).—In observations made at the Hamburg abattoir, it was found that 40 per cent of the cattle which during life had been suspected of tuberculosis were suffering from tuberculosis of the intestinal mucous membrane. These animals represented 1.35 per thousand of all the cattle slaughtered in Hamburg.

The infection generally started in the last third of the small intestine, in the submucous follicles—rarely in the mucous membrane proper. In addition to these lesions in the small intestine the cecum contained tuberculous ulcers in 17 per cent of the cases and the colon in 8 per cent. In 25 per cent of the cases no characteristic lesions were found on the outer aspect of the intestine. The mesenteric glands were always affected and, in addition, a series of other organs and their lymphatic glands are nearly always tuberculous, the lungs being affected with particular frequency. This intestinal tuberculosis can not be diagnosed with certainty in the living animals since suspicious symptoms, such as marked diarrhea, are often absent even in severe cases, and the bacteriological examination of the dung also generally fails to reveal it.

Report of the International Commission on the Control of Bovine Tuberculosis (*Ottawa, 1910, pp. 41*).—This report was presented for the consideration of the Dominion Public Health Conference, at Ottawa, October 12, 1910.

Bovine tuberculosis legislation, M. H. Reynolds (*Amer. Vet. Rev., 38 (1910), No. 1, pp. 37–47*).—In a study which the author made of the laws, organization, and work now being done in the several States of the Union it was found that "25 States impose tuberculin test restrictions on importation; 16 States have some provision for compensation; 14 States provide for testing by the State, i. e., the State may test; 17 States of the Union have provision for compulsory reporting; only 5 States have any provision for carcass salvage; but 2 States have legal provisions for pasteurization of creamery skimmed milk, although this is a most serious source of dissemination; 1 has state meat inspection service; 2, possibly 3, are attempting to control the distribution and use of tuberculin; 17 States have no special provisions referring to tuberculosis; and 21 States of the Union are not even pretending to do anything with the great problem of bovine tuberculosis."

Some methods employed in northern Europe to control bovine tuberculosis, V. A. Moore (*Amer. Vet. Rev., 38 (1910), No. 1, pp. 48–55*).—Investigations by the author during the summer of 1909 of the methods employed for the control of bovine tuberculosis in Denmark, England, Germany, and Holland are briefly reported.

The so-called Bang method practiced in Denmark was found to be quite as effective in small as in large herds. The method is generally considered by cattle owners in Denmark to be entirely satisfactory, and if carefully applied to give the desired results. The increased profits accruing to those who have sound herds is tending to bring more and more farmers to apply the method.

In Germany the method which for the time is receiving most attention is that proposed by Ostertag. This consists in eliminating by slaughter all clinical cases of tuberculosis, removing the calves promptly after birth from their dams and keeping them separated for some months, after which they may be placed with the other cattle.

Although there is no country where the feeling is stronger that bovine tuberculosis is of great sanitary significance than Great Britain, there seems to be no other where so little direct effort has been put forth to eliminate this disease from cattle. In Holland at present only cattle belonging to breeders are killed and compensated for by the government.

"The lesson from the experience in Denmark is that in order to keep herds free from tuberculosis the owner must be educated in the nature of the disease and that until he is thus educated there is little hope of securing herds permanently free from this disease."

A new tuberculin, F. J. ROSENBACH (*Deut. Med. Wchnschr., 36 (1910), Nos. 33, pp. 1513–1517; 34, pp. 1553–1557; abs. in Schweiz. Wchnschr. Chem. u. Pharm., 48 (1910), No. 41, pp. 637, 638*).—The tuberculin is produced as follows:

A few particles of the fungus *Trichophyton holosericum album* are sprinkled on a 6 to 8-week old tubercle bacillus culture and allowed to develop for from 10 to 12 days at from 20 to 22° C., or until the greater part of the culture is covered with the mycelia of the fungus. After this the culture mass (tubercle bacilli and mold fungus) is separated from the liquid, rubbed up with a glycerin-carbolic-acid solution, and filtered. The filtrate is then mixed with the original culture solution filtrate, made up to 10 times the bulk of the original fungus mass (tubercle bacillus+trichophyton), and conserved with a 1/2 per cent carbolic acid solution. The tuberculin is given in doses for man of from 0.01 to 0.1 and 0.2 gm., whereas the old tuberculin of Koch takes for its initial dosage from 0.001 to 0.01 mg.

Comparisons are made between this tuberculin and others.

Investigations in regard to bacillary pseudotubercular diseases, with particular regard to pseudotuberculosis ovis, K. GLÄSSER (*Arch. Wiss. u. Prakt. Tierheilk., 35 (1909), Nos. 4–5, pp. 471–510; 6, pp. 582–613, pls. 2, figs. 2; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 34, p. 671*).—As a result of his work the author concludes that only one pseudotuberculosis bacillus exists, but that this appears in numerous varieties which he classifies as follows: One specially pathogenic to mice (*Bacillus pseudotuberculosis murium*), one variety pathogenic for mice and rats (*Sabrazès* var.), one which is pathogenic to the remaining gnawing animals (*B. pseudotuberculosis rodentium*), and one which is pathogenic for sheep (*B. pseudotuberculosis ovis*).

In the sheep the pathological processes with this bacterium are entirely different from those of true tuberculosis, so that the term "*Pseudotuberculosis ovis*" is not well selected. On the other hand, a close relation seems to exist between this disease and *Pyobacillosis bovis* and *P. suis*, as in both conditions the pathological and anatomical processes have some features which are identical (such as pus formation). The morphology, staining, and cultural characteristics of the two causative bacteria also agree very well.

Epizootic abortion in cattle, J. MCFADYEAN ET AL. (*Rpt. Dept. Com. Bd. Agr. and Fisheries* [*Gt. Brit.*], *Epizootic Abortion, 1910, pt. 2, pp. 118*).—The greater part of this second paper (E. S. R., 22, p. 584) is taken up by the minutes of evidence submitted by the principal societies representative of cattle breeding and dairying in Great Britain, a total of 18 witnesses having been examined.

The evidence thus gained is briefly reviewed by the committee who recommend that as a preliminary measure this affection be dealt with by compulsory notification of suspected cases of the disease, veterinary inquiry to establish the existence of disease on any particular premises, and temporary isolation and restriction of the movements of any cow that has recently aborted. Following the application of these recommendations, the committee considers it desirable that measures should be taken to avert the possible introduction of infection in cows imported into Great Britain from Ireland, the Channel Islands, or the Isle of Man.

Contagious abortion, K. W. STOUDER (*Kansas Sta. Circ. 14, pp. 3*).—A brief popular account.

Abortion in cattle, R. H. JOHNSON (*Amer. Vet. Rev., 37 (1910), No. 5, pp. 630–637*).—A general discussion of the subject.

The sterility of cows, its causes and treatment, J. ALBRECHTSEN (*La Stérilité des Vaches, ses Causes et son Traitement. Berlin, 1910, pp. 96, figs. 21; rev. in Rec. Méd. Vét., 87 (1910), No. 7, p. 269*).—An account based upon investigations conducted by the author in Denmark.

Granular venereal disease of cattle—infectious vaginal catarrh—infectious vaginitis, A. I. SORENSEN (*Amer. Vet. Rev., 37 (1910), No. 5, pp. 646–649*).—The author reports the occurrence of this affection in a large dairy community in California.

Infectious vaginitis in cattle, A. S. ALEXANDER (*Hoard's Dairyman, 41 (1910), No. 35, pp. 1022, 1023*).—The author states that he has seen one bad generalized outbreak of the affection in a Wisconsin herd that had been given above average care and that there is no doubt but that the ailment is prevalent in many herds in Wisconsin and neighboring States.

The curative treatment of blackleg with pyocyanase, L. FORTINEAU (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 22, pp. 1454–1456; abs. in Chem. Zentbl., 1910, II, No. 7, pp. 489, 490*).—Mixed cultures of *Bacillus carbonis* and *B. pyocyaneus* possess a diminished virulence. The toxins of the various strains of *B. pyocyaneus* were found to have a beneficial influence on rabbits and guinea pigs having experimentally-produced symptomatic anthrax, provided the injections were made 24 hours after the infection with *B. carbonis*. On the other hand, the curative effect of pyocyanase with animals infected with the blood or bacteria taken directly from infected animals is not marked. If pyocyanase is injected 2 days after injecting *B. carbonis* the course of the disease is not checked. Animals treated with pyocyanase at the proper time retained their resistance toward symptomatic anthrax for several months.

In regard to vaccination against blackleg by O. Thomas' method, R. HUSSON (*Abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 37, pp. 729, 730*).—This is a report of the Haute-Marne Veterinary Society on the Thomas method, which consists of inserting a silk thread impregnated with symptomatic anthrax spores of known virulence under the skin at the lower third of the tail of the animal with the aid of a vaccinating needle. The observations tend to show that the same immunity which is obtained with fluid vaccines can be gotten with this method. The results obtained during a period of 25 years are regarded as favorable.

Observations in regard to the occurrence of epizootic panaritium of cattle, JOHN (*Arch. Wiss. u. Prakt. Tierheilk., 36 (1910), No. 1, pp. 97–119; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 35, pp. 686, 687*).—Feeding beet tops and chips, distillery slops, etc., to cattle seems to predispose them to a necrotic infection of the hoof. The supposition is that an anemia is induced in the Klauenlederhaut of the hoof and that this, in conjunction with long standing in stalls with uneven stone floors, pasturing, or pregnancy, causes a separation of the horny part of the hoof from its Klauenhaut in the interdigital space. Certain kinds of straw (lupine, barley, and bean) are also predisposing factors to the condition. The following local remedies were found valuable in the treatment of this malady: (1) ℞ Zinc chlorid 100.0, copper sulphate 50.0, and Aq. Font. 200.0; (2) thigenol. From 2 to 4 weeks was necessary to bring about a complete recovery.

The microbe of contagious pleuro-pneumonia, BORREL ET AL. (*Ann. Inst. Pasteur, 24 (1910), No. 3, pp. 168–179, figs. 13*).—The name *Asterococcus mycoïdes* is given to the organism, studies of which are here reported. The authors state that it is not a spirillum or spirochete as reported by Bordet.

The morphology of the microbe of contagious pleuro-pneumonia of cattle, J. BORDET (*Ann. Inst. Pasteur, 24 (1910), No. 3, pp. 161–167, figs. 4*).—The author has cultivated this organism upon various media and here discusses its morphology. See also a previous note (E. S. R., 23, p. 85).

Methods for the eradication of gid, M. C. HALL (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 165, pp. 29, pl. 1, figs. 14*).—This is a summarized account of the disease of sheep caused by the larval stage of the tapeworm now known as *Multiceps multiceps*, accounts relating to which have been previously noted (E. S. R., 24, p. 87). The subject is dealt with under the headings of presence of gid in the United States, losses from gid, desirability of eradication, life history of the gid parasite, life history in relation to Montana conditions, symptoms of gid, and eradication of gid.

The symptoms of gid are described as very striking and readily distinguishable in most cases. As to the possibility of eradication, it is stated that the Bureau of Animal Industry is confident that this can be accomplished, but only through the care and interest of sheepmen. It may be accomplished in 2 ways: First, by destroying the heads or at least the brains of sheep dying of gid; and second, by keeping sheep dogs and other ranch dogs free from the tapeworms. Of these two steps the first is much the more important, for the reason that it is much more practical and effective than the second and also much easier. The heads may be destroyed by burning or by splitting the skull, scooping out and chopping up, or crushing the brains and then covering them with turpentine, formaldehyde or sheep dip. Instead of killing giddy sheep and destroying the brain, the more favorable cases may be operated on if desired, the method of operating being here described. "Tapeworm remedies should be administered to dogs at least once a year when the outbreak of gid for the year is over. The medicines may be measured out in capsules. The tapeworms should be destroyed by burning or burying with quicklime or sheep dip."

Epizootic papillomatous stomatitis of goats in the Congo, C. FIRKET (*Ann. Méd. Vét., 59 (1910), No. 7, pp. 369–373*).—An account is given of a disease thought to be undescribed, which appeared in April, 1909, among goats near Stanleyville in the Belgian Congo.

Hog cholera investigations, DAMMANN and STEDEFEDER (*Arch. Wiss. u. Prakt. Tierheilk., 36 (1910), No. 4–5, pp. 432–484*).—The first series of these extensive tests was conducted with germ-free filtrates (extracts) of the blood and organs of hogs.

The tests show a close agreement with the findings of De Schweinitz, Dorset and his coworkers Bolton and McBryde (E. S. R., 17, p. 87), and others, although there were cases in which no transmission by a filtrable virus was possible. In all of the cases no *Bacillus suipestifer* was found in the organs. The authors, however, examined another group of cases in which *B. suipestifer* was present, with the result that they were not able to produce classical hog cholera from the bacteria-free filtrates. On the other hand, by feeding and injecting the bacilli intravenously typical hog cholera could be produced. Natural cohabitation tests with animals infected artificially also produced the symptoms. These findings with *B. suipestifer* (Voldagsen) stand in direct contradiction to Dorset's findings and Ostertag's and Uhlenhuth's conceptions. The authors consider this bacillus a potent infective agent instead of a weakly virulent one.

In order to establish whether the bacilli employed in these experiments were actually of the coli-typhoid or hog-cholera group, the authors made bacteriological, cultural, and feeding tests with *B. typhi*, *B. enteritidis* (Gärtner), *B. coli*, *B. paratyphi* B, *B. suipestifer* (Uhlenhuth) and *B. suipestifer* (Voldagsen). From the tests and the pathological findings it was found that none of the above bacteria, except Voldagsen's bacillus, produced symptoms or pathological changes like those of hog cholera, and this leads the authors to believe that none of them are related to Voldagsen's bacillus. A serum was prepared which was efficient for the bacillary form of the disease when used with young animals but no effective serum could be made for the ultravisible form.

Immunity in young pigs from cholera immune sows, M. H. Reynolds (*Amer. Vet. Rev., 38 (1910), No. 2, pp. 236, 237*).—Investigations conducted at the Minnesota Station during the past 2 years indicate that young pigs from immune sows are highly immune to cholera inoculation, but that if they are not inoculated the immunity is gradually lost. Inoculation with virulent blood during this immune period has given permanent immunity but pen exposure while nursing has not given satisfactory results. A small amount of work with pigs from susceptible sows indicates that such pigs do not have any important immunity at birth.

Investigations in regard to the activities of Bacillus suipestifer and various antisera, W. Rickmann (*Arch. Wiss. u. Prakt. Tierheilk., 36 (1910), No. 3, pp. 249–304; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 2 (1910), No. 18, p. 509*).—Infection and immunizing tests were conducted with living bacteria, bouillon toxins, wash water toxins, shaking extracts, and intact but killed cells with hogs and horses.

The toxins of the shaking extracts were resistant to heat, while the bouillon toxins and wash water toxins were labile and nonresistant. A further distinction found between the shaking extract toxin and bouillon toxin is that only with the former can a protection against bacterial infection be obtained. With hogs and horses the injection of living bacteria was relatively harmless. On the other hand, the bacteria-free bouillon toxin and the sterile shaking extracts were very toxic and produced symptoms of an acute intoxication which resulted in death.

From this the author concludes that the clinical findings produced by *B. suipestifer* are to be considered an expression of the action of its toxins. With these toxins it was possible to produce pathological changes in the lumen of the intestine by way of the tissue and also intravenously. From this the author was led to believe that the intestinal changes were not only the result of localized toxin action but were also due to resorbed toxins which are in the body fluids and blood, and which are again discharged into the lumen of the gut and there produce changes at the point of discharge.

A contribution on the occurrence of Ascaris lumbricoïdes, W. Meyer (*Ztschr. Fleisch u. Milchhyg., 20 (1910), No. 4, pp. 127, 128; abs. in Ann. Méd. Vét., 59 (1910), No. 7, pp. 409, 410*).—While this nematode is occasionally found in the intestines of swine its presence in large numbers, as here described, occurs but rarely. The form found in swine is said to be smaller than that which affects man.

Trichinosis, C. Staubli (*Trichinosis. Wiesbaden, 1909, pp. XII+295, pls. 14, figs. 18; rev. in Bul. Inst. Pasteur, 8 (1910), No. 8, pp. 338–340*).—In this monograph the author takes up the history, geographical distribution and etiology of trichinosis, the biology of *Trichinella spiralis*, its occurrence in the body, the effect of its presence upon the components of the blood, its relation to bacterial infection, occurrence in mammals, etc.

An extensive bibliography and author and subject indexes complete the work.

Anthrax and helminthiasis in the horse, CHARON, VALADE, and TEXIER (*Rec. Méd. Vét.*, *87* (*1910*), *No. 15, pp. 505–509*).—A description of a case in an artillery horse, in which ascarids and anthrax bacilli were present at the same time.

The behavior toward saponin of the blood (plasma, serum, and erythrocytes) from a horse having pernicious anemia, E. ABDERHALDEN and W. FREI (*Arch. Wiss. u. Prakt. Tierheilk.*, *36* (*1910*), *No. 4–5, pp. 423–431, charts 2*).—The authors sought to determine whether the serum from animals having pernicious anemia and the serum of normal animals behave alike, and whether the blood and the erythrocytes alone react in the same manner toward saponin.

The results show that larger amounts of saponin were necessary to bring about hemolysis in the blood in pernicious anemia than in normal blood. Between the washed erythrocytes from normal animals and animals having pernicious anemia no difference in regard to hemolysis could be noted. Inhibition was greater with the serum of pernicious anemia than with normal serum.

Osteoporosis affecting horses in Ceylon, G. W. STURGESS (*Vet. Jour.*, *66* (*1910*), *No. 425, pp. 682–685*).—The author states that cases of this affection probably occur in every part of Ceylon.

Strangles (Adenitis equorum).—Vaccination tests with Schreiber's lymph, A. ZÖRNER (*Arch. Wiss. u. Prakt. Tierheilk.*, *36* (*1910*), *No. 4–5, pp. 532–582, charts 12*).—Schreiber's lymph is a maceration extract obtained from 3 strains of streptococci taken from the affected glands. From his work the author concludes that the lymph is a valuable therapeutic agent, and that the perfectly clear lymph can be employed intravenously or subcutaneously and without danger. Its injection has a decidedly beneficial constitutional effect, and when employed early it has a tendency to prevent metastasis and to keep the condition localized. The lymph can also be utilized for actively immunizing sound horses and foals. The author further found that the lymph does not stimulate an aggresin (Bail) action.

The cure of surra in horses by the administration of arsenic, J. D. E. HOLMES (*Parasitology*, *3* (*1910*), *No. 3, pp. 288–306, pls. 6*).—"The results herein recorded are further evidence that arsenic is a specific for surra in horses; that a permanent cure is effected, and not merely a temporary tolerance of the disease; that the treatment is simple, and that by careful dosage 70 per cent and upward of surra cases, even when contracted spontaneously and in the last stage, can be cured. Arsenic is best administered in form of arsenious acid, in bolus or in solution. Atoxyl is a convenient form of giving arsenic hypodermically."

The methods of dosage which have been found successful and the principles upon which the success of the arsenic treatment depends are described.

The preventive dose of tetanus antitoxin for the horse: Its relation to the American unit, A. P. HITCHENS (*Amer. Vet. Rev.*, *37* (*1910*), *No. 5, pp. 597–610*).—The object of this paper was to present proof (1) that in the customary doses employed tetanus antitoxin is a valuable preventive agent; and (2) to ascertain the efficient dose expressed in American units. From his work the author concludes that "tetanus antitoxin as a preventive of tetanus in the horse is as nearly perfect as anything in biology can be. A very small quantity of tetanus antitoxin is sufficient to protect a horse against an ordinary infection. Clinical experience proves a dose of 500 units to be amply sufficient for practically all cases."

Impaction from alfalfa hay, J. W. McGinnis (*Amer. Vet. Rev., 38 (1910), No. 2, pp. 238, 239*).—The author has met with 2 forms of impaction in horses fed upon alfalfa hay, one due to a very firm ball of improperly masticated alfalfa hay lodged usually in the floating colon, and the other to an enormous quantity of food in the large colon.

Some new results in treating dog distemper with serum, Piorkowski (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 37, pp. 723, 724*).—The author relates the results obtained with Piorkowski's serum in the treatment of distemper.

The influence which licking has upon the healing of wounds in the dog, Suffran (*Rev. Vét. [Toulouse], 34 (1909), No. 12, pp. 737–751; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 37, p. 730*).—The author shows that licking the wound by the animal itself is decidedly inhibitory to the healing of the wound.

The excretion of virulent fowl cholera bacteria by highly infected animals, J. Müller (*Monatsh. Prakt. Tierheilk., 21 (1910), No. 9–10, pp. 385–413; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 2 (1910), No. 17, p. 455*).—Fowls fed highly virulent material with a few exceptions survived. In the excrement of these animals it was possible to detect in 5 instances fowl cholera bacilli within 24 hours, but after from 24 to 30 hours the bacilli could not be detected in the digestive tract. Three weeks after giving the infectious material the bacteria were discharged in the urine, and this was kept up in one instance for 4 months. The organs contained virulent material after a period of 6 months.

On the occurrence of schizogony in an avian leucocytozoon, Leucocytozoon lovati, parasitic in the red grouse, Lagopus scoticus, H. B. Fantham (*Ann. Trop. Med. and Par., 4 (1910), No. 2, pp. 255–258, pl. 1*).—The author states that *L. lovati* may be transmitted from grouse to grouse by the agency of the grouse fly, *Ornithomyia lagopodis*, as vermicules devoid of melanin pigment have been found in the gut of the fly.

Studies on avian hemoprotozoa.—I, On certain parasites of the chaffinch (Fringilla cœlebs) and the redpoll (Linota rufescens), H. M. Woodcock (*Quart. Jour. Micros. Sci. [London], n. ser., 55 (1910), No. 220, pp. 641–740, pls. 5*).—*Trypanosoma fringillinarum* is described as new and notes are given on *Halteridium fringillæ* and *Leucocytozoon fringillinarum*.

Dipping and tick-destroying agents, H. Watkins-Pitchford (*Natal Agr. Jour., 15 (1910), No. 3, pp. 312–329*).—A second report (E. S. R., 21, p. 687).

Electrical recording thermometers for clinical work, H. L. Callendar (*Proc. Physical Soc. London, vol. 22; abs. in Jour. Roy. Army Corps, 15 (1910), No. 4, p. 508*).—The author describes a number of forms of electrical thermometers designed for obtaining a continuous record of the body temperature. The thermometers vary in construction according to the use to which they are to be put.

RURAL ECONOMICS.

The farmer as a business man, J. L. Coulter (*Farm and Fireside, 34 (1910), No. 3, pp. 5, 15, figs. 2*).—This article points out the advantages to individual farmers of cooperative organizations for the marketing of such products as fruits, vegetables, dairy and poultry products, meat, and the more staple crops, such as grain, cotton, and tobacco.

Information is given regarding the business methods, membership, and extent of business of cooperative societies for canning and preserving perishable products, cooperative fruit and truck associations, creameries and cheese factories, grain elevators, cotton warehouses and gins, and other societies in different parts of the United States. The advantages of organization are thus summarized:

"It should constantly be kept in mind that a successful local organization is a good thing, because it brings the members greater profits, because it is of great social value, because of its educational value, and because it is a clearing house for progressive ideas concerning farming in general. But a successful group of cooperative locals is a better thing, because it brings still greater profit to each local. It balances or distributes local losses and, properly managed, it brings better goods to the consumer at a lower price by eliminating extra cost of handling and loss of goods."

Exchange values of farm products (*Farm Cement News, 1 (1910), No. 9, pp. 29–31*).—This article presents statistics derived from Bulletins 39 and 87 of the U. S. Bureau of Labor with reference to the purchasing power of products in the years 1896 and 1910, and discusses their bearing on the economic status of farmers. The figures indicate an increase of exchange value of many agricultural products ranging from 25 to 400 per cent, the general result being that the farmer's standard of living has greatly improved during the past few years.

The South and the world's cotton supply (*Manfrs.' Rec., 58 (1910), No. 13, pp. 60–61*).—This article discusses the efforts made by the British Government for more than a century to encourage the culture of cotton in India and other colonial possessions with a view to making British manufacturers of cotton goods less dependent upon the supply of raw cotton from the South. Notwithstanding these efforts little progress has been made in increasing the supply in other countries, so that "the South still dominates the situation as strongly as it did 60 years ago, and the careful student of world affairs is compelled to admit that there is not in sight anywhere any serious competition for the next quarter of a century at least with the South in supplying the world's cotton needs."

Cooperation at home and abroad, C. R. FAY (*New York and London [1908], pp. XVI+403*).—This volume discusses the cooperative movement in the United Kingdom, Germany, Denmark, Switzerland, France, Belgium, and Italy in its four main phases of cooperative banks or credit societies, agricultural societies, workers' societies, and stores.

The cooperative movement in Denmark, A. NIELSON ET AL. (*Le Mouvement Coopératif en Danemark. Copenhagen, 1910, pp. 41*).—This pamphlet consists of several papers, prepared for distribution at the First International Congress of Agricultural Societies and of Rural Demography, held at Brussels in September, 1910, which give authoritative information concerning the origin, principles, organization, development, and business methods of the various agricultural cooperative societies in Denmark. In these papers, statistics and data are given to the year 1910 on live stock breeding societies, cow-testing associations, cattle-exporting societies, and societies for the purchase and manufacture of supplies, including the cooperative purchase of feeding stuffs and cooperative dairies, pig slaughter houses, and egg-exporting societies.

In contrast with such societies in other countries, the cooperative societies in Denmark are confined almost entirely to the economic improvement of their members. While it is recognized that the public high schools have had a great influence in promoting the moral and material welfare of the agricultural classes, it is to the cooperative movement that credit is given for establishing Danish agriculture on a sound basis and making peasant ownership of small holdings a profitable undertaking. The social benefits of the movement are also briefly considered.

Agricultural cooperation in Denmark, M. KOEFOED (*Coopération dans l'Agriculture en Danemark. Copenhagen, 1910, pp. 30*).—This pamphlet, issued by the government bureau of statistics, gives detailed information, with statistics to the close of 1909, on the origin, development, business, and membership of the various agricultural cooperative societies in Denmark. The statistical data are in more detail than in the pamphlet noted above. On January 1, 1910, the number of cooperative societies, not including those for the exportation of cattle and eggs, was 3,610, with about 390,000 members.

State assistance to agriculture in Denmark (*Irish Homestead, 17 (1910), No. 44, pp. 900–902*).—This article presents statistics and gives the methods adopted by the Danish Government for encouraging the different lines of the agricultural industry. The budget for 1910 carried the sum of nearly $1,366,700 for these purposes. The different societies receiving aid, the annual amounts, and methods of securing the funds are described.

Associations for the manufacture of products in Italy, V. MAGALDI (*Bol. Quind. Soc. Agr. Ital., 15 (1910), Nos. 19, pp. 818–822; 22, pp. 914–920*).—Articles similar in scope to that by Ferroni previously noted (E. S. R., 23, p. 594) are here presented.

The principles of agricultural reform, G. F. DE LA ROSA (*Bol. Agr. Téc. y Econ., 2 (1910), Nos. 16, pp. 407–414; 17, pp. 515–523*).—This article sets forth the changes that should be inaugurated in order to rehabilitate the agricultural industry in Spain.

In the author's opinion the more liberal and scientific use of farm manures and chemical fertilizers, better systems of farm management including crop rotation and systematic fallowing, the establishment and extension of a sound system of agricultural credit, a scientific method of securing agricultural statistics, and the development of a system of practical agricultural education are the foundations for establishing agriculture in Spain on a sounder economic basis. In this respect it is pointed out that agricultural reform in Spain must take into consideration the physiographical features, the different products grown, and the characteristics of the people in the various provinces.

Our rural districts depopulated, our cities overpopulated: The facts, causes and remedies, C. DIDIER (*Jour. Soc. Cent. Agr. Belg., 57 (1910), Nos. 8, pp. 214–222; 9–10, pp. 225–238*).—This article discusses in detail the statistics relating to the changes in the agricultural and industrial population of Belgium from 1846 to 1909, with a view to ascertaining the real causes that have brought about these social conditions and suggesting remedies for the solution of the problem.

In the author's opinion the depopulation of rural districts in Belgium has run parallel with the disappearance of small proprietary holdings. This has been due to a poor social organization, a combination of unfavorable laws, and to numerous national extravagances which have resulted in ruining the small proprietors who constitute the main strength of a country. The remedy for the problem is simply to reestablish small proprietary holdings on a sound economic basis and to abolish by law every form of special privilege.

The bibliography relating to the solution of the agrarian problem in various countries is indicated by quotations from numerous economists and sociologists who have discussed the subject.

Small holdings and agricultural credit societies (*Jour. Bd. Agr. [London], 17 (1910), No. 6, pp. 485–488*).—The number of agricultural credit societies, credit banks, land societies, small holdings and allotments societies, ordinary and agricultural cooperative societies, societies for the promotion of agriculture, arboriculture, and horticulture, and cattle-insurance societies registered in England and Wales is reported, and their organization and objects briefly discussed.

[Agricultural conditions in Bavaria], EHRENBACHER (*Diplo. and Cons. Rpts. [London], Ann. Ser., 1910, No. 4565, pp. 6, 7, 43, 44*).—Notes are given on the population, the number of women employed in agriculture, the National Live-stock Insurance Union, and the extent of the insurance of horses in Bavaria.

In 1909, of a population of 6,800,000, 40 per cent was engaged in agriculture as compared with an average of 28.7 per cent for the empire. The census of 1907 showed 873,000 women as against 825,000 men engaged in agricultural pursuits, the number of non-independent women amounting to 63.3 per cent of the total non-independent rural laborers. The conditions seem to demand an increased force of female agriculturists for teaching women how to become more efficient in the modern important and profitable ways of general farming, poultry raising, fruit and vegetable growing, dairying, etc. The number of local live-stock insurance unions affiliated with the national union was 1,689 in 1909, with 85,117 members, as compared with 1,646 societies and 83,982 members the preceding year, while the horse insurance societies on October 31, 1909, numbered 477 with 34,991 members insuring 80,811 horses valued at $13,007,967.

Mortgage relations in Prussia from 1904 to 1908, F. KUHNERT (*Landw. Wchnbl. Schles. Holst., 60 (1910), No. 42, pp. 801–804*).—The agricultural mortgage movement in Prussia is discussed, statistics being given for the period extending from April 1, 1886, to March 31, 1909, but more particularly for the 5-year period from 1904 to 1908. During this time mortgages in rural districts were registered to the amount of $1,397,752,580, and redeemed to the amount of $795,077,080. The cancellation of mortgages under forced sale amounted to $65,040,640, or about 8 per cent of the total amount of mortgage cancellation.

[Agricultural statistics and conditions in New South Wales], J. B. TRIVETT (*Off. Yearbook N. S. Wales, 1908–9, pp. 20–38, 140–179, 252–316*).—Statistical data are presented and discussed regarding the population, land legislation and settlement, rural settlement, agriculture, pastoral industry, and dairying in New South Wales to 1909.

Only about 31 per cent of the population resided in rural districts, and the number of holdings of one acre and upward in extent acquired from the government by grant or purchase has been 83,045, with a total area of 50,509,842 acres. Of this area only 2,713,971 acres was in crops and 807,924 acres in grass. The number of live stock in 1908 was horses 591,045, cattle 2,955,934, sheep 43,370,797, and pigs 215,822, while the number of dairy cows was 527,843. The development of the province in the different lines of agricultural industry is indicated by comparative figures covering a large number of years.

Outlines of agriculture in Japan, C. SHIMOOKA (*Tokyo: Govt., 1910, pp. IX+132, pls. 19, map 1*).—Abridged and revised from a work previously noted (E. S. R., 22, p. 91).

The introduction of improvements into Indian agriculture, H. H. MANN (*Philippine Agr. Rev. [English Ed.], 3 (1910), No. 9, pp. 525–535*).—This article enumerates the difficulties, such as conservatism and lack of initiative on the part of farmers in India, lack of capital, and annual interest rates ranging from 25 to 75 per cent, which have to be met in efforts to improve agricultural methods in India. During the past few years, however, the government has made some progress in the introduction of improvements into Indian agriculture, and this article summarizes the opinion of a committee appointed by the board of agriculture in 1908 to consider methods of improvement and their applicability in the future.

Among the suggestions made are for careful experimenting and study as to the adaptability of a given implement or crop to certain localities, the securing of the confidence of the rural people, the formation of local associations of agriculturists for cooperation and discussion in the vernacular, demonstration farms among the cultivators themselves to show the value of crops and machinery, government assistance in furnishing large quantities of good seed, a study of the farmers' difficulties and needs in each locality, the extension over wider areas of exhibitions, shows, and publications, and the better training of the sons of farmers.

Statistics of cultivated areas and of crop and live-stock production in the adhering countries (*Statistique des Superficies Cultivées, de la Production Végétable et du Bétail dans les Pays Adhérents. Rome, 1910, pp. XX+168*).—Data for the countries adhering to the International Institute of Agriculture from the year 1898–99 to 1909 are reported from the official documents of the various governments.

Agricultural statistics of Ireland, with detailed report for the year 1909, T. P. GILL (*Dept. Agr. and Tech. Instr. Ireland, Agr. Statis. 1909, pp. XXXIX+152*).—This report, in addition to tables issued by the department during the year showing the acreage under crops, the number of live stock, and the yields of the several crops, includes "(1) particulars of the number and size of agricultural holdings and of their distribution; (2) a comparative record of the changes which have taken place in the several counties during the past ten years as regards the extent and yield of the chief crops and the number of live stock; (3) statistics of the area of the chief kinds of bush and tree fruits; and (4) statistics of the area under woods and coppice, and of planting and felling operations." The holdings numbered 603,827 as compared with 601,765 in 1908 (E. S. R., 22, p. 396). The number of holdings not exceeding one acre was 85,644, the estimated area of which was 39,600 acres.

AGRICULTURAL EDUCATION.

Soil fertility laboratory manual, C. G. HOPKINS and J. H. PETTIT (*Boston and London [1910], pp. vi+70, fig. 1*).—This manual embodies a course of 27 practicums for a course of study in soil fertility, as developed at the College of Agriculture of the University of Illinois. These include the determination of nitrogen in farm produce, soils, animal excrements, and fertilizers, and of phosphorus in farm produce, soils, and fertilizers, nitrification, the determination of total plant food and of the reaction and acidity of soils, the fixation of bases in soils and of phosphorus by soils, the effect of lime upon nitrification, and the preparation of pot cultures, plant food solutions and standard solutions used in the laboratory exercises. Tables of atomic weights and specific gravity, and a list of necessary apparatus are included. There is also an appendix containing several additional practicums for advanced students.

Domesticated animals and plants, E. DAVENPORT (*Boston, New York, Chicago, and London, 1910, pp. XIV+321, pl. 1, figs. 49*).—The author states that this book was prepared in response to a demand for a volume running along the same general lines as his Principles of Breeding (E. S. R., 19, p. 773), but somewhat less technical and adapted to the needs of high schools and normal schools. This he has accomplished by devoting less space to the philosophic treatment of variation and heredity, and more to the origin of domesticated races, the sources of materials out of which they have been formed, and the general subject of natural selection and the survival of the fittest.

The book is divided into 2 parts. In part 1, which comprises the major part of the text-book, the author discusses the dependence of man upon domesticated animals and plants, the domestication of animals and plants and their need of improvement, the effect of natural selection, unit characters, variability of a single character, how characters are transmitted, abnormal development, and how characters behave in transmission, with several chapters relating to heredity and environment and the improvement of plants and animals. Part 2 deals with the origin of domesticated races of animals, grains and grasses, legumes, fruits, vegetables, and miscellaneous plants, and in the opinion of the author may be omitted in case a brief course is desired, or it may be employed as additional text or as reference matter.

Farm friends and farm foes, C. M. WEED (*Boston, New York, and Chicago, 1910, pp. XI+334, figs. 160, map 1*).—The author has prepared this volume as a text-book dealing with weeds, insects, fungi, birds, and mammals, the relationships of which to agriculture are either decidedly helpful or decidedly harmful. The book combines information with suggestions for observations, practicums, and experiments, together with numerous references to other helpful literature.

Dumb animals and how to treat them, E. K. WHITEHEAD (*Denver, Colo., 1909, pp. 128, figs. 45*).—The author has assembled in this little book, intended as a text-book or reader in public schools, considerable information concerning horses, cattle, and other domestic animals, as well as some wild animals. This is presented in a way to arouse the interest and sympathy of young children and encourage them to treat such animals kindly.

A secondary course in animal production, H. R. SMITH (*U. S. Dept. Agr., Office Expt. Stas. Circ. 100, pp. 56*).—This is the thirteenth report of the committee on instruction in agriculture of the Association of American Agricultural Colleges and Experiment Stations, and the third report of that committee on agriculture in public high schools.

The report contains general suggestions to teachers of animal production and a syllabus of 155 lectures, recitations, and practicums, with numerous references to text-books, manuals, and bulletins. The subjects considered include types and breeds of horses, cattle, sheep, goats, swine, and poultry, the feeding and care of these animals, and lessons on dairying. There are also lists of text-books, manuals, and apparatus for the dairy laboratory.

How to agriculturize the teaching of botany in the high school and still retain the essential principles of botany, H. F. BERGMAN (*N. Dak. Farmer, 12 (1910), No. 5, p. 13*).—The author maintains that whether botany is taught as general, agricultural, pharmaceutical, or economic botany, the underlying principles are always the same, but he believes that interest in the subject can be increased for rural students by using agricultural material. He advises against the use of a text-book in beginning botany and would not use the microscope very extensively. Suggestions are given concerning work with seeds, roots, leaves and stems, and flowers, experiments in the composition of plants, and studies of the gross appearance, habits, and methods of control of some of the more important plant diseases.

Winthrop rural school and home institute (*Winthrop Norm. and Indus. Col. S. C. Bul., 3 (1910), No. 3, pp. 46*).—This number contains the proceedings of an institute held at Rock Hill, S. C., November 13, 1909, which included the following addresses: Home Making as a Profession, by Carriebelle Hyde; The Spraying of Plants, by L. A. Niven; Hygiene in Home and School, by May F. Jones; Sewing in the Home, by Lora Able; Food and Our Meals, by Margaret Whittemore; and How Agriculture May Be Taught in the Public Schools, by F. W. Howe.

Elementary agriculture and school gardening at Winthrop, MINNIE MACFEAT (*Winthrop Norm. and Indus. Col. S. C. Bul., 3 (1910), No. 4, pp. 40, pls. 7, figs. 12, dgm. 1*).—The purpose of this bulletin is to assist the teachers of South Carolina by "setting before them as simply and clearly as possible the methods in school gardening which have been successfully worked out at Winthrop." The suggestions relate to the selection of the site, the crops to be planted, the preparation of the soil, laying out the plats, tools, seeds, suitable lessons in gardening for the fall, winter, and spring, a course of study extending over 9 grades, references to books and bulletins, and addresses of seed and garden implement houses.

[Outlines of work for the Nebraska boys' and girls' clubs] (*Nebr. Dept. Pub. Instr. Buls., 2. ser., 11, pp. 46, figs. 23; 12, pp. 12, figs. 5; 14, pp. 8, figs. 4; 15, pp. 12, figs. 3; 16, pp. 12, dgms. 5; 17, pp. 15, figs. 3, dgms. 2; 18, pp. 32, figs. 34; 19, pp. 20, figs. 2, dgms. 6*).—The subjects of these bulletins are as follows: 11, Course in Cookery for Nebraska Girls Domestic Science Clubs, by Gertrude N. Rowan; 12, General Outline of Plans for the Nebraska Boys and Girls Club, 1910; 14, How to Test Seed Corn, by A. E. Nelson; 15, Directions for Planting the Ear to Row Test with Corn—The Size of Seed-Piece Experiment with Potatoes—Suggestions on Acre Contest and Sweet Pea Culture, by A. E. Nelson; 16, Directions for Sewing, Recipes for Cooking, and Sweet Pea Culture for Nebraska Boys and Girls Club, by Gertrude N. Rowan; 17 and 19, Directions for Sewing, Recipes for Cooking for Nebraska Boys and Girls Club, by Gertrude N. Rowan; and 18, Some Common Weeds and Insects of Nebraska Corn Fields and Potato Patches, by A. E. Nelson.

School gardens, M. E. Couchman (*Agr. Jour. India, 5 (1910), No. 3, pp. 212–221*).—This is an address, delivered by the Director of Agriculture of the Madras Presidency at the annual college day celebration, to the students of the Madras Teachers' College at Saidapet. In it he discusses the reasons why more and better school gardens are desirable in Madras, and the functions and purposes of school gardens.

Arbor Day in the Philippines, J. S. Potter (*Philippine Agr. Rev. [English Ed.], 3 (1910), No. 9, pp. 536–541*).—This article contains an excerpt from an Arbor Day circular sent out by the division superintendent of Occidental Negros, containing many valuable suggestions on the purpose and proper manner of recognizing Arbor Day, notes on the observance of Arbor Day in different divisions, and a brief statement of duties following the celebration of Arbor Day and of the benefits accruing to the people and to the country.

MISCELLANEOUS.

Twenty-second Annual Report of New York Cornell Station, 1909 (*New York Cornell Sta. Rpt. 1909, pp. LX+71–517+16+16, pls. 41, figs. 134*).—This report, which is not intended for general distribution, contains the organization list of the station, a report of the president of the university, a report of the director which includes brief statements of the main lines of work of the various departments, a financial statement as to the federal funds for the fiscal year ended June 30, 1909, and reprints of Bulletins 259–269, and of Circulars 4–7, all of which have been previously noted, the Circular 7 included being that of May, 1910 (E. S. R., 23, p. 426).

Annual Report of South Dakota Station, 1910 (*South Dakota Sta. Rpt. 1910, pp. 30*).—This contains a report by the director on the organization and publications of the station, a financial statement for the fiscal year ended June 30, 1910, and departmental reports, of which a portion of that of the agronomist is abstracted on page 334 of this issue.

Twenty-second Annual Report of Vermont Station, 1909 (*Vermont Sta. Rpt. 1909, pp. XVI+260+[8]+XXV–XXVIII, pls. 13, figs. 6*).— This contains the organization list, a brief announcement concerning the station, a financial statement for the fiscal year ended June 30, 1909, a report of the director on the publications and work of the station, and reprints of Bulletins 138–143, and of Circulars 1–3, which have been previously noted.

Monthly Bulletin of the Department Library, November, 1910 (*U. S. Dept. Agr., Library Mo. Bul., 1 (1910), No. 11, pp. 297–316*).—This number contains data as to the accessions to the Library of this Department during November, 1910, and of additions to the list of periodicals currently received.

NOTES.

Alabama College and Station.—Two bills relating to the work of the college and station have recently received the approval of the governor. One of these appropriates $26,800 annually to the station, $7,000 being for local fertilizer and cultural tests, $2,300 for combating the boll weevil and other injurious insects, $1,200 for plant-breeding work, $1,300 for work in drainage, irrigation, and farm machinery, $2,500 for publications and other administrative expenses, $2,000 for horticultural investigations, $3,500 for live-stock investigations, $1,000 for combating plant diseases, $1,000 for poultry work, and $5,000 for agricultural extension. It is also provided that if the governor shall certify that the condition of the State treasury warrants the additional expenditure, the amounts for each of these items may be doubled during 1912, 1913, and 1914.

The second act establishes a State board of agriculture, to consist of the commissioner of agriculture and industries, the director of the station, and the professor of school agriculture in the college, together with two practical farmers appointed by these three. This board is to receive an annual appropriation of $25,000 from the sale of fertilizer tags for use in farm demonstration work in cooperation with this Department.

Michigan College.—Frank W. Chamberlain, associate professor of veterinary science and animal husbandry at the University of Idaho, has accepted the associate professorship of anatomy, and has entered upon his duties.

Nebraska University and Station.—Frank J. Phillips, head of the forestry department since 1907, died February 13, at the age of 29 years. He was a graduate of the Michigan College and of the University of Michigan, receiving the degree of master of science in forestry from the latter institution in 1907. He was in the employ of the Forest Service of this Department for about three years previous to his appointment in the university and station, and remained a collaborator with it.

Oklahoma College and Station.—O. O. Churchill, assistant professor of agronomy at the North Dakota College and assistant in agronomy in the station, has entered upon his duties as professor of agronomy in the college and agronomist in the station. S. A. Minear, formerly connected with the horticultural extension work at the Georgia College, has been appointed assistant professor of agriculture for schools.

Tennessee University and Station.—Five short courses, each lasting one or two weeks, were held in different parts of the State in cooperation with the State department of agriculture during November and December, 1910, with an aggregate attendance of about 600 students. The short course in agriculture at the university in January and February had an attendance of 57 students.

S. E. Barnes, field expert in dairying in cooperation with this Department, and W. H. Maynard, assistant chemist, have resigned to engage in commercial work.

Virginia Truck Station.—The station has just completed the erection of a greenhouse 21 by 100 feet, with an attached workroom 20 by 40 feet, for use in connection with the vegetable forcing work.

EXPERIMENT STATION RECORD.

CONTENTS OF VOL. XXIV, NO. 5.

SUBJECT LIST OF ABSTRACTS.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

AGRICULTURAL BOTANY.

FIELD CROPS.

HORTICULTURE.

FORESTRY.

DISEASES OF PLANTS.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

FOODS—HUMAN NUTRITION.

Page.

ANIMAL PRODUCTION.

DAIRY FARMING—DAIRYING.

VETERINARY MEDICINE.

RURAL ENGINEERING.

RURAL ECONOMICS.

AGRICULTURAL EDUCATION.

MISCELLANEOUS.

LIST OF EXPERIMENT STATION AND DEPARTMENT PUBLICATIONS REVIEWED.

NOTE.—The price of *Experiment Station Record* is $1 per volume, and two volumes are issued annually. It may be purchased from the Superintendent of Documents, Washington, D. C., to whom all remittances should be made. The publications of the State experiment stations are distributed from the stations and not from the Department.

EXPERIMENT STATION RECORD.

Vol. XXIV. April, 1911. No. 5.

The growth of the National Department of Agriculture during the past ten years has far exceeded that of all of its preceding history. This was pointed out by Hon. Charles F. Scott, chairman of the House Committee on Agriculture, in submitting the new agricultural appropriation bill last winter. Its growth as marked by a decade has been phenomenal, viewed either from the standpoint of its scope and authority, its material resources, or its personnel.

As a full fledged department with a Cabinet minister at its head, the Department dates only from 1889. But if we go back to 1839, when $1,000 was appropriated for "agricultural statistics," and include every dollar appropriated out of the Treasury of the United States for agricultural purposes down to and including the year 1900, the total sum is, as Mr. Scott pointed out, only $45,102,616, while the aggregate of all the money appropriated from the end of 1900 to the end of the current fiscal year reaches a sum nearly double this, or $90,012,058. For the fiscal year 1901 the appropriation for maintenance was $3,304,265.97. This year the Department has at its disposal $15,470,634.16. "Ten years ago the total number of persons employed in the Department was 3,388; this year if all the rolls were called an army of 12,480 men and women would respond."

Under the bill which the committee submitted, and which after considerable discussion and amendment received the signature of President Taft March 4, provision is made for an even greater development during the ensuing year. The aggregate amount carried by the act is $16,900,016, which by far exceeds that granted in any previous measure, and is $887,950 in excess of the estimates submitted by the Department.

There is an apparent increase over the appropriation act for 1911 of $3,412,380, but of this $720,000 is only nominal, since it merely replaces what has hitherto been provided automatically as a permanent appropriation to the State experiment stations under the Adams Act. It will be recalled that by the terms of that act as subsequently construed in the appropriation act for 1907, definite appropriations were made only until July 1, 1911. The action taken by Congress now provides for the continuance of the Adams Fund on the same basis as the Hatch Fund, requiring the amounts to be appropriated annually in the agricultural bill. With due allowance for this item, however, there is still an actual enlargement of the appropriations of every bureau, and a net increase of fully 20 per cent for the Department as a whole.

In general the increased appropriations are for the purpose of extending and developing lines of work already under way rather than the undertaking of new projects, and some of the principal increases are for what may be termed the administrative activities of the Department. One of the largest new items is an appropriation of $1,000,000 for fighting and preventing forest fires in the National Forests in cases of extraordinary emergency. This appropriation is in addition to the regular appropriation of $150,000 for fire fighting under ordinary conditions, and supplements deficiency appropriations of over $900,000 incurred as a result of the disastrous fires of last summer.

The Federal meat inspection, which has been enforced by the Department from a permanent annual appropriation of $3,000,000, receives an indirect increase of $155,000 through the transfer of its clerical force to the statutory roll of the Bureau of Animal Industry. The Bureau of Chemistry receives $60,000 additional for the enforcement of the Food and Drugs Act, and the Weather Bureau $75,490 additional for its weather service. Provision is also made by an appropriation of $87,000 for the enforcement of the Insecticide Act, which became effective January 1, 1911, and for which a deficiency appropriation of $35,000 had been allowed for expenses to July 1.

A number of propositions involving general legislation were considered in connection with the bill, but as finally enacted the law remains substantially a routine measure. The Secretary was again authorized to continue investigations on the cost of food supplies at the farm and to the consumer; and a special appropriation of $5,000 was added for a study of chestnut bark disease.

Comparison of the allotments to the various bureaus in this act and those preceding it is rendered difficult because their clerical employees will, in accordance with a clause inserted in the act of 1911, be transferred on July 1 from the various lump-fund appropriations on which a portion of them had been carried to the roll of positions specifically provided for. These transfers in certain cases—as, for example, in this office and the Bureau of Statistics—involve but a few employees, but in the case of the Forest Service, where 1,894 forest rangers and similar employees are to be transferred, they occasion an apparent increase in the appropriations for statutory salaries from $60,200 for the current year to $2,318,680, with a corresponding deduction from lump-fund appropriations. The lump-fund appropriations, therefore, for a particular purpose, such as biological investigations or soil-survey work, no longer indicate so completely as they did previously the entire expenditures for these objects. Comparison is still possible, however, as regards the aggregate appropriations of the bureaus.

The Weather Bureau receives a total of $1,600,250. Of this amount, $15,000 is for the restoration of the Weather Bureau station at Key West, Florida, wrecked by hurricanes in October, 1910. The allotment for maintenance of the bureau printing office was reduced to $18,000 by reason of the recent transfer of a portion of the equipment to the Government Printing Office. For investigation of climatology and evaporation $120,000 was provided, as at present.

The appropriations to the Bureau of Animal Industry aggregate $1,654,750. Aside from the increase due to the transfers from the meat-inspection act, previously referred to, the chief additions are those of $7,120 for the tick-eradication work, making that appropriation $250,000; an increase of $7,000 for the work of the Dairy Division, making its total $150,000; and of $7,640 for the Animal Husbandry Division, or $47,480 for that work. Under a new clause inserted in the act, the Secretary of Agriculture is authorized to permit, under certain conditions, the admission of tick-infested cattle from Mexico into those portions of Texas below the quarantine line.

New appropriations were made of $65,000 for the purchase of land for quarantine stations near Baltimore, Maryland, and Boston, Massachusetts; $10,000 for equipping the 475-acre experiment farm which has recently been acquired at Beltsville, Maryland; and $16,500 for constructing buildings at this farm and that at Bethesda, Maryland. It is expected to utilize the Beltsville farm for the experimental work of the Animal Husbandry and Dairy Divisions, and to reserve that at Bethesda for pathological investigations.

One of the largest increases in the bill was accorded to the Bureau of Plant Industry, which will receive $303,480 additional, making its total $2,061,686. The lump-fund appropriation for general expenses is $1,441,536, which is divided among thirty projects. Some of the largest of these are $350,000 for the boll-weevil campaign (a net increase of $106,945); methods of crop production in the semiarid or dry-land sections, and for the utilization of lands reclaimed under the Reclamation Act, for which a net increase of $38,270 and a total of $143,060 is granted; $142,920 for the farm management studies, of which $4,000 is to be used in agricultural reconnoisance work in Alaska; studies of the production, handling, grading, and transportation of grains, for which $135,005 is available, an increase of $24,500; and the studies of fruit improvement and the methods of growing, packing, and marketing fruits, which will have $87,735. The investigations of the cotton industry were extended to include the ginning and wrapping of cotton.

For the purchase and distribution of valuable seeds and plants the allotment made was $289,680. This is an apparent decrease of $19,910, but it is accounted for in part by transfers of clerical employees to the statutory roll of the bureau, and in part by the segregation as a distinct project of $20,000, which was formerly supported from this fund. The two items comprising this appropriation are the congressional seed distribution, which is continued on the usual basis, with $237,160, and the allotment for the introduction of seeds and plants from foreign countries, which is increased to $52,520.

The appropriations to the Forest Service reached a total of $5,533,100, in addition to the various emergency appropriations to which reference has been made. This, as usual, represents the largest appropriation to any one bureau, and is also the largest increase over the previous year, the total for 1911 having been $5,008,100. The policy of definite allotments to each of the 161 National Forests for maintenance was continued. The Nebraska National Forest was authorized to furnish young trees free of charge to settlers in the surrounding region.

The sum of $150,000 was granted for fighting forest fires and for other unforeseen emergencies, of which $70,000 is immediately available. The allotment for permanent improvements on the National Forests was increased from $275,000 to $500,000. Provision was made for the refunding to claimants of moneys erroneously collected in the administration of the National Forests, and for the granting of easements under certain conditions for rights of way across the public lands, National Forests, and reservations, for the transmission of electrical power and for telephone and telegraph purposes.

Liberal provision for the development of investigational work was also made, $177,040 being granted for investigations of methods for wood distillation and preservation and the economic use of forest products, including the testing of woods for paper making, together with $18,420 for investigations of range conditions within National Forests and range improvement, $251,168 for silvicultural and dendrological experiments, and $33,760 for miscellaneous forest investigations and the preparation and dissemination of results.

The appropriation of the Bureau of Soils was increased to $262,060. No appropriation was made for soil erosion investigations, for which $5,000 has been allotted annually for many years. The soil survey work received $145,000, a net increase of $13,040, with a provision added limiting to 10 per cent the expenditures in any State.

The bureau was authorized to undertake a new line of work by the appropriation of $12,500 "for exploration and investigation within the United States to determine a possible source of supply of potash, nitrates, and other natural fertilizers," $2,500 being made immediately available. It is expected that particular attention will be devoted to possible sources of potash in view of the present situation as regards the German potash supply. The work will also be supplemented by researches to be conducted by the Geological Survey, which received authority in the sundry civil appropriation act to expend $40,000 "for chemical and physical researches relating to the geology of the United States, including researches with a view of determining geological conditions favorable to the presence of potash salts." According to a recent announcement from the Survey, the expenditure of half this appropriation for the potash exploration is contemplated.

The Bureau of Entomology receives an aggregate of $601,920. This is an increase of $69,740, mainly for the extension of work to the alfalfa weevil and for enlarging the investigations on insects affecting rice and sugar cane, for demonstration work against forest insects, and for additional studies in bee culture. The largest single allotment is for the continuation of the campaign against the gipsy and brown-tail moths, for which the appropriation is $284,840.

The large proportionate increase of $52,780 was accorded the Bureau of Biological Survey, making its total $139,700. All the various lines of work were continued on a more comprehensive basis, and new items were included of $2,500 for the purchase, capture, and transportation of game for national reservations, and of $20,000 for the feeding, protecting, and removal of elk at Jackson's Hole, Wyoming, and vicinity. The latter appropriation is made immediately available and remains available until expended.

The activities of the Office of Public Roads have been rapidly increasing in recent years, and to keep pace with the growing demands the appropriation was increased from $114,240 to $160,720. A new line of work authorized is the conducting of field experiments in road construction and maintenance, for which $10,000 is granted.

The total appropriation of the Office of Experiment Stations is $1,864,000, of which $1,440,000 is allotted to the State experiment stations under the Hatch and Adams Acts. Of the remainder, $56,500 is for statutory salaries and $37,500, a net increase of $5,000, is for general expenses. The allotment of $10,000 for the agricultural education service was continued as at present.

The nutrition investigations received an increase of $5,000, making $15,000 available for this purpose. This increase will enable further extension of these investigations and the preparation of popular bulletins setting forth plans for the more economical and effective utilization of agricultural products as human food, for which data a strong demand has been in evidence.

An estimate of $20,000, submitted for the preparation, publication, and dissemination of original technical reports of the scientific investigations of the experiment stations by the Secretary of Agriculture in cooperation with the Association of American Agricultural Colleges and Experiment Stations, was favorably recommended by both the House and Senate Committees, but failed of passage.

The Alaska, Hawaii, and Porto Rico experiment stations were given $30,000 each, an increase of $2,000 in each case to equalize their funds with those received by the State stations from Federal funds, and the Guam Station was continued at $15,000. The clause requiring the expenditure of $5,000 by the Porto Rico Station for coffee experiments was omitted, thereby restoring the coffee work to the same basis on which it has been conducted for many years previous to the passage of the act for 1911.

The irrigation and drainage investigations each received $100,000, a net increase of $32,820 and $25,980, respectively. These increases will enable the extension of these lines of work, especially in the rendering of assistance to settlers in newly irrigated regions, and in formulating plans for the reclamation of swamp lands. The provision requiring a special report of the aggregate expenses in the drainage investigations to date and the areas in the several States and Territories which have been investigated was continued.

The work of the remaining bureaus was provided for along substantially the present lines. Including the increase previously noted for the enforcement of the Food and Drugs Act, the Bureau of Chemistry will receive $68,080 more than at present, and a total of $963,780. The Bureau of Statistics is given $231,620; the Library, $40,500; the Office of the Secretary, $276,450; the Division of Accounts, $97,520; the Division of Publications, $209,960; and the fund for contingent expenses, $110,000. These all contain small increases, occasioned in general by the growth of the Department.

In addition to the sums carried in the appropriation act itself, there should also be considered the appropriation of $470,000 for the Department printing and binding, which appears in the appropriation act for sundry civil expenses. This represents a nominal increase of $10,000, but $22,000 more than at present is assigned to the Weather Bureau by reason of the transfer of a portion of its branch printing office, making a virtual decrease of $12,000 for the remainder of the Department. There is also to be added the permanent appropriation of $3,000,000 for the meat-inspection work. Deficiency appropriations were granted, as well, of $923,192.90 for the fighting of forest fires in 1910, the relief of employees of the Department killed or injured in that campaign, and for horses and equipment destroyed during it, and $35,000 for the enforcement of the Insecticide Act during 1911.

Additional funds which will be administered by the Department are provided in the measure enacted at the recent session of Congress for the protection of the watersheds of navigable streams, and popularly known as the "Appalachian Forest Reserve" Act. Under this act the Secretary of Agriculture may expend $200,000, in coöperation with States requesting it, in the protection from fire of the forested watersheds of navigable streams, irrespective of ownership. He is further authorized to purchase, following a favorable report by the Geological Survey and the approval of a National Forest Reservation Commission, of which he is ex officio a member, lands located at the headwaters of navigable streams, and to administer these lands as permanent National Forests. An appropriation of $2,000,000 is made annually until July 1, 1915, for the examination and acquisition of these lands, together with $25,000 additional annually for the expenses of the commission. A more extended summary of this act appears on another page (p. 498).

Eliminating the deficiency appropriations and that for the Forest Reservation Commission, these various appropriations, which are intimately connected with the work of the Department, would if added to the regular appropriations make a grand total of $22,570,016. This is a large sum, but as was pointed out by Chairman Scott in concluding the presentation of the bill, "the money appropriated for the Department of Agriculture is an investment and not an expense. And that it has been a good investment the statistics showing the expansion of agriculture and the improvement in methods throughout our country bear eloquent witness. During these past ten years, while the Department of Agriculture has been expending $90,000,000, the farmers of the United States have added to the wealth of the world the stupendous and incomprehensible sum of $80,000,000,000. Without anything like a corresponding increase in the area of land under cultivation, the value of the farm products of our country has risen from slightly more than $4,000,000,000 ten years ago to nearly $9,000,000,000 in 1910.

"The conclusion is inevitable, therefore—and that conclusion could be made incontestable by innumerable other proofs if time permitted—that the farmers of America are applying better methods and getting better results from their labors than ever before. And in devising these better methods, in pointing the way for better results, the Department of Agriculture has been the undisputed leader, as it should be, and has thus beyond cavil or question derived from the money it has expended a percentage of profit to all the people which can not be calculated."

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

International catalogue of scientific literature. D—Chemistry (*Internat. Cat. Sci. Lit., 7 (1910), pp. VIII+1137*).—The literature indexed comprises material received between December, 1907, and December, 1908, and continues previous work (E. S. R., 21, p. 112).

Methods and results of micro-chemistry, A. PRENANT (*Jour. Anat. et Physiol. [Paris], 46 (1910), No. 4, pp. 343–404*).—The evolution of the science of micro-chemistry is considered, with particular reference to the reactions employed in vegetable and animal histology and physiological chemistry.

Methods for producing colloidal solutions of inorganic substances, T. SVEDBERG (*Die Methoden zur Herstellung Kolloider Lösungen Anorganischer Stoffe. Dresden, 1909, pp. XII+507, pls. 3, figs. 60*).—A clear description of the condensation and dispersion methods for producing colloidal solutions of inorganic bodies.

Analysis and determination of the constitution of organic compounds, H. MEYER (*Analyse und Konstitutionsermittelung Organischer Verbindungen. Berlin, 1909, 2. ed., rev. and enl., pp. XXXII+1003, figs. 235*).—This is the second edition of this work, which has been entirely rewritten and brought up to date.

The usefulness of curves in the interpretation of microbial and biochemical processes, O. RAHN (*Michigan Sta. Tech. Bul. 5, pp. 29, figs. 18*).—A discussion of the possibility and value of interpreting microbial or biological processes mathematically.

"If a curve of a biochemical process is platted, taking as abscissa the time elapsed and as ordinate the total amounts of compounds produced, the shape of this curve will in many instances indicate the nature of the change taking place. In a purely chemical or enzymic change, the active mass does not increase, and therefore the rapidity of the process measured by the angle of elevation of the curve does not increase. . . . The curve changes with the time, becoming gradually parallel to the base line. If we are dealing with changes caused by micro-organisms, the active mass increases as long as micro-organisms increase, and consequently the rate of the process or the angle of elevation will rise as long as the increase continues. This elevation of the curve is characteristic for compounds produced by any multiplying organism. From the time the increase ceases, we are dealing with a purely enzymic curve.

"The exact platting of the curve allows us to make fairly accurate statements about the multiplication and the duration of the increase of bacteria, even if they can not be counted by our present methods. The point of inflection of a curve shows the moment when the organisms producing the substance under study reach their maximum number and can be studied with greatest convenience.

"In some instances, the point of inflection is changed to a straight line, indicating a strain of bacteria very resistant to their own products; this seems to take place especially in poor media, as soil extracts. A few experiments indicate that poorly nourished bacteria are able to produce a larger amount of fermentation products than well nourished bacteria though they need a much longer time to accomplish it."

The employment of curves for indicating biochemical processes, O. RAHN (*Centbl. Bakt.* [*etc.*], *2. Abt., 28* (*1910*), *No. 4–5, pp. 111–126, dgms. 16*).—Substantially a German translation of the article noted above.

Occurrence of arsenic in soils, plants, fruits, and animals, W. P. HEADDEN (*Proc. Colo. Sci. Soc., 9* (*1910*), *pp. 345–360; abs. in Jour. Chem. Soc.* [*London*], *98* (*1910*), *No. 576, II, p. 890*).—The author found arsenic in a form slightly soluble in water to be widely distributed in the virgin soils of Colorado, especially in those of a marly character, the amount varying from 2.5 to 5 parts per million. It was found in the marls underlying the soils in amounts varying from 4 to 15 parts per million. Soils on which crops had been grown, which had been sprayed with arsenic preparations, were found to contain from 10 to 28 times as much arsenic as the virgin soils. Arsenic was found in alfalfa, oats, potatoes, apples, and pears grown on such soils, as well as in the flesh and kidneys of animals which had been fattened on the alfalfa. Arsenic was also found in the urine of persons who had eaten freely of apples grown on trees sprayed with arsenic compounds.

About the estimation of phosphates, SCHUYTEN (*Abs. in Chem. Ztg., 34* (*1910*), *No. 80, p. 717*).—The investigations show good results with the Woy-Maude method (E. S. R., 23, p. 613).

The properties of Lintner's soluble starch, E. D. CLARK (*Jour. Biol. Chem., 7* (*1910*), *No. 6, pp. lv–lvii*).—"Litner's soluble starch carries associated with it certain amounts of dextrins with reducing power, from which it can be only partially freed by dialysis or alcohol precipitation. It is probable, also, that the method by which commercial starch is prepared renders such starch less capable of yielding Lintner's soluble starch of the least possible reducing power."

The use of methylene blue as an indicator in iodometric titrations, F. S. SINNATT (*Analyst, 35* (*1910*), *No. 412, pp. 309, 310*).—It is shown that a solution containing 0.05 gm. of methylene blue per liter can be used in place of starch for iodometric titrations. One cc. for each 50 cc. is a sufficient amount to give a good depth of color.

A new form of extraction apparatus, C. W. GREENE (*Jour. Biol. Chem., 7* (*1910*), *No. 6, pp. 503–507, fig. 1*).—A device is described in which the essential features of the Soxhlet extraction apparatus are retained and the objectionable ones such as the extraction with a cold or lukewarm menstrum avoided. A Gooch crucible can be easily placed in this form of apparatus and the latter used in connection with the usual Hopkins condenser.

Sulphurous acid in chopped meat, B. KÜHN and J. RÜHLE (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20* (*1910*), *No. 1, pp. 10–19*).—The authors investigated as to whether sulphurous acid or sulphur compounds could be transformed into sulphuric acid when distilling with iodin solution, but the results indicated that this is not the case. They could not verify the findings of other investigators (E. S. R., 17, p. 1177; 19, p. 706) with reference to the oxidation of sulphur compounds to sulphuric acid when working with decomposed meat.

The determination of the deterioration of maize, with incidental reference to pellagra, O. F. BLACK and C. L. ALSBERG (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 199, pp. 36*).—The authors in the first part of this bulletin point out the almost entire lack of methods, particularly in the English language, for testing the fitness of corn for human consumption, and give a detailed description of a method for determining the acidity of corn as used in the Bureau of

Plant Industry, and which can be carried out by untrained persons and without much chemical apparatus. Part 2 considers the physical, chemical, and biological methods, which require more skill in manipulation, for examining whole and ground deteriorated corn, and criticizes the results obtained with them. In this connection the authors discuss the relation of the moisture content to the deterioration of this cereal, and point out the advantages to be attained by its proper curing and drying.

In determining the acidity by the method referred to it is shown that grinding to a 16-mesh (sieve) fineness and an extraction period of 24 hours with alcohol is satisfactory, variation of the concentration of the solvent, due to various amounts of water in the corn, being without significance. Selected samples of various varieties of high-grade seed corn tested showed an acidity equivalent to from 13 to 24 cc. of normal alkali per kilogram of corn, a moisture content ranging from 7.56 to 10.09 per cent, and ash from 1.18 to 1.59 per cent. Samples of commercial corn meal, purchased in various cities of the United States, gave an acidity content per kilogram varying from 13 to 78 cc. of normal alkali. With a carload of decomposed corn, the samples of which were taken at different depths of the car, acidity figures were obtained for from 64 to 95 cc. of normal alkali per kilogram.

A few preliminary experiments were made to determine the relation of the protein to the acidity formation in spoiled corn, but yielded negative results. The significance and value of the fat and ash determination are discussed, particularly as to the degree of degermination of the corn. Ori's catalase test, according to the authors, may give with degerminated spoiled corn a reaction no more intense than a normal, unspoiled corn, since the catalase exists chiefly in the germ. The toxicity test, Gosio's phenol reaction, and the test for microorganisms and for a tendency to become moldy are also discussed.

Detection of urotropin in wine, C. BLAREZ (*Bul. Trav. Soc. Pharm. Bordeaux, 1910, p. 49; abs. in Chem. Ztg., 34 (1910), No. 79, Repert., p. 319*).—The author not finding the official test conclusive, recommends the following procedure: Of 50 cc. of the wine containing 10 drops of sulphuric acid, 3 fractions of 10 cc. each and one of 5 cc. are distilled. To one-half of the first fraction (*a*) is added, after acidifying, some bisulphite fuchsin solution, and to the other half from 2 to 3 drops of hydrochloric acid-phenylhydrazin solution, 1 drop of 50 per cent iron perchlorid solution, and from 5 to 6 drops of hydrochloric acid. The solution becomes yellow and remains so in most cases, even when the wine contains sulphurous acid and urotropin at the same time. When large amounts of urotropin (0.05 per cent or more) and small amounts of sulphurous acid are present the solution has a bilberry color. Fraction *b* is treated with hydrochloric acid-phenylhydrazin solution, ferric chlorid, and hydrochloric acid. At times this solution quickly assumes a blue color and at other times only after 5, 10, or 15 minutes. Fractions *c* and *d* (10 and 5 cc., respectively) are treated in the same manner and observed for 15 minutes, and on the basis of the slow or rapid and depth of coloration of the liquid the author estimates the amount of urotropin present.

Methods of analysis for the German brandy tax (*Ztschr. Analyt. Chem., 49 (1910), No. 6, App., pp. 17–27*).—This includes the methods of sampling, testing, and analyzing collodion, varnishes, polishes, soap, denaturizing substances such as wood alcohol, pyridin bases, lavender and rosemary oils, shellac solution, camphor, benzol, animal oil, pure methyl alcohol, castor oil, vinegar, brandies, etc.

Caramel and its adulterations, P. CARLES (*Ann. Falsif., 3 (1910), No. 20, pp. 255, 256; abs. in Chem. Ztg., 34 (1910), No. 89, Repert., p. 365*).—Caramel which is produced from sugar or molasses and by heat is more or less pure, and in France it is legally allowed as a coloring matter for brandies, vinegar, cordials, etc. It is also employed for coloring spoiled wines which have previously been decolorized with animal charcoal. The chief adulterant of caramel consists of an addition of either ammonium or sodium carbonate, which has the faculty of increasing the coloring power of the product.

Recent progress in the chemistry of the sugars, J. S. HEPBURN (*Jour. Franklin Inst., 170 (1910), No. 2, pp. 86–116*).—This paper reviews the work of E. Fischer upon sugars and ferments. The syntheses of monoses, disaccharids and glucosids are described. The fermentation of the sugars and the action of the various inverting enzyms are discussed, as is also the lock-and-key theory of enzym action. The splitting of racemic sugar derivatives into their active components and asymmetric syntheses within the sugar group are also considered.

Important work in pure sugar chemistry which has appeared in the first half year of 1910, E. O. VON LIPPMANN (*Deut. Zuckerindus., 35 (1910), Nos. 27, pp. 544, 545; 28, pp. 559–561; 29, pp. 581, 582; 30, pp. 595, 596*).—A review of literature.

The inversion of cane sugar under the influence of acids and neutral salts, N. DEERR (*Hawaiian Sugar Planters' Sta., Agr. and Chem. Bul. 35, pp. 36, fig. 1*).—This work summarizes the literature and reports additional results, dealing chiefly with the physico-chemical processes involved. The topics discussed, and in most instances studied experimentally, are the following: Rate of inversion of cane sugar by acids, relative strength of acids as determined by the rate of inversion, effect of temperature on the inversion, effect of concentration of the acid, inversion in pure aqueous solution at high temperature, inversion of cane sugar under the influence of salts, influence of neutral salts, action of nonconductors, the action of neutral salts on the rate of inversion of cane sugar by acids, action of chlorids of the alkalis in concentrated solution, the action of salts in concentrated solution on the rate of inversion of cane sugar at ordinary temperatures under the influence of acids in more concentrated solutions, increase in velocity of inversion due to the presence of nitrates, action of sulphates, influence of varying amounts of salt on the rate of inversion, the action of glucose on the inversion of cane sugar, the action of ammonium salts on inversion, the effect of neutralization of an acid on the rate of inversion, the process of making sugars for direct consumption, and experiments with juice.

The influence of micro-organisms upon the quality of maple sirup, H. A. EDSON (*Jour. Indus. and Engin. Chem., 2 (1910), No. 7, pp. 325–327*).—Previously noted from another source (E. S. R., 23, p. 64).

Lipase of molds, N. DELEANO (*Arch. Sci. Biol. [St. Petersb.], 13 (1907), No. 2, pp. 207–209; abs. in Chem. Abs., 4 (1910), No. 14, p. 1871*).—Filtrates of extracts of *Aspergillus niger*, *A. flavus*, and *Penicillium glaucum* contained a lipase which was capable of splitting simple artificial fats.

About an antiprotease in yeast press juice, E. BUCHNER and H. HAEHN (*Biochem. Ztschr., 26 (1910), No. 3–4, pp. 171–198*).—From the experimental data it appears that an antienzym, antiprotease, exists in boiled yeast press juice.

The action of light upon catalase, F. BATELLI and L. STERN (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 22, pp. 1040–1042*).—Catalase is destroyed by light, no difference in the rate of destruction being evident whether it is in media of oxygen or not. No oxycatalase is produced by the light rays. Philocatalase has not the capacity to regenerate catalase which has been destroyed by the light rays. Alcohol, aldehyde, and formates, etc., in certain concentrations protect catalase from the destructive action of light.

The origin of the catalase in milk and its significance for the control of the milk supply, A. Faitelowitz (*Milchw. Zentbl.*, *6* (*1910*), *Nos. 7, pp. 299–316; 8, pp. 361–381; 9, pp. 420–427*).—According to the author the most certain and rapid method for estimating the catalytic activity of milk is by use of the formula $C=\frac{1}{t}l\left(\frac{a}{a-x}\right)$, where t is the time, a the number of cubic centimeters of oxygen in the hydrogen peroxid originally taken, and x the cubic centimeters of oxygen in the hydrogen peroxid evolved. This value in fresh unneutralized milk fluctuated between 0.0025 and 0.0055. The increase of the catalytic activity of fresh milk in these tests began at room temperature only after from 24 to 30 hours, at 37° C. in from 6 to 8 hours, and with iced milk only after from 3 to 4 days.

Chloroform did not influence the catalytic activity of fresh or old milk in which the catalase had already developed, but its addition (2:100) prevented the formation of new catalase, and in this way it was possible to determine the catalytic activity of milk as drawn from the animal in barn samples. Formalin, on the other hand, was found to weaken the catalytic process, the reaction being influenced to the greatest extent when the formaldehyde was added to the hydrogen peroxid first.

Lactic and acetic acid also weakened the catalysis, but with fresh milks the action is doubled upon neutralization. If alkali is added above the point of neutralization this increase in strength does not occur. On the other hand, milk which has been allowed to become acid or curdled in the incubator, or coagulated with lactic acid, does not increase in the amount of activity when neutralized. The maximum amount of catalysis was present when milk was allowed to acidify and coagulate at room temperature and after neutralization. Milk which had been boiled and allowed to curdle gave, as a rule, a higher maximum catalytic activity than raw milks. The catalase seems to be present in the solid particles (precipitate portion) of the serum and in the curd. The multiplication of catalase takes place quicker in the curd than in the serum. From the serum, however, a strong catalytic substance could be isolated.

Some color reactions for differentiating heated from raw cow's milk, T. Sames (*Milchw. Zentbl.*, *6* (*1910*), *No. 10, pp. 462–468*).—After describing the various color reactions utilized for detecting boiled and raw milk, the author details his findings in regard to the enzymic and nonenzymic characteristics of the supposed ferments of milk.

With the methylene blue reductase test the author was never able to note a decoloration within ½ hour, and therefore concluded that the view expressed by others that the reductase reaction is probably of bacterial origin and is of no value for differentiating boiled from raw milk is correct. The Schardinger formaldehyde-methylene blue reaction does not depend upon bacterial sources, as was shown in an article previously noted (E. S. R., 23, p. 709). Rendering 10 cc. of boiled milk alkaline with 6 drops of normal alkali produces the reaction, and this also renders doubtful the presence of enzyms, as a solution of milk sugar to which 2 drops of an alkaline substance has been added produces the identical reaction.

In regard to the oxidase reaction the author shows this to be caused by the true protein in an alkaline medium, i. e., by the precipitate obtained with alcohol from serum after the casein has been previously removed with acetic acid. This reaction was still present when the solution was heated to 52° C., but was absent at 60°.

The author points out that the guaiac and guaiac-hydrogen peroxid method still remains one of the best methods for differentiating raw and boiled milk, but that in any event none of the reactions proposed for this test should be wholly relied upon without taking other factors into consideration.

About blue milk, Van Melckebeke (*Abs. in Chem. Ztg., 34 (1910), No. 80, p. 717*).—Milk when boiled in an aluminum vessel for a long time takes on a blue hue, especially when starch is present. The aluminum in the milk seems to be in a colloidal state. See also a previous note (E. S. R., 20, p. 1006).

Methods for the examination of milk and dairy products, K. Teichert (*Methoden zur Untersuchung von Milch und Molkereiprodukten. Stuttgart, 1909, pp. 374, figs. 54*).—In addition to the usual bacteriological and chemical methods employed in the examination of dairy products, this work considers the newer methods in vogue in Europe and America.

A modification in the method for determining the ester number in butter, J. Hanuš and F. Petřík (*Abs. in Chem. Ztg., 34 (1910), No. 82, p. 736*).—The Hanus and Stehl method (E. S. R., 18, p. 811) has been modified in so far that after the esterification, 150 cc. and then 100 cc. of the aqueous fractions are caught successively. By saponifying both fractions and titrating the remaining alkali the amount of decinormal alkali used for saponifying the volatile ethyl esters is determined. For cocoa fat this amount is about 80 cc. and for butter from 18 to 22 cc. The presence of salicylic or benzoic acid does not influence the results.

Report of the agricultural-chemical experiment station of the chamber of agriculture at Schleswig-Holstein for 1909, H. Wehnert (*Jahresber. Agr. Chem. Vers. Stat. Landw. Kammer Schles.-Holst., 1909, pp. 26*).—A report of the activities of the station is given for the year 1909, with a statement as to the number of analyses made of feeding stuffs from various sources and miscellaneous substances and a discussion of the results. The number and kind of animal and vegetable pests found in the various seeds, woods, etc., examined are also reported.

Report of the senior analyst, 1909, C. F. Juritz (*Rpt. Senior Anal. Cape Good Hope, 1909, pp. 133–164*).—A report of the activities of the senior analyst for the year 1909. The analyses made during this time included dairy products, fermentation products, fertilizers, cereals, mineral analyses, and miscellaneous substances, such as cotton goods, wood charcoal, etc.

The technology of fats and oils, edited by G. Hefter (*Technologie der Fette und Öle. Berlin, 1910, vol. 3, pp. XII+1023, pls. 13, figs. 292*).—This volume deals chiefly with the edible oils; butter, its history, chemistry, manufacture, laws, and sale; butter substitutes, their manufacture, etc.; lard and lard substitutes; vegetable butters; vegetable and animal lubricating and burning oils and fats; boiled oils and varnishes; textile oils; stearin and candle manufacture, etc.

Drying and dryers, O. Marr (*Das Trocknen und die Trockner. Munich and Berlin, 1910, pp. IX+416, figs. 215*).—This work deals with the theory and practice of desiccation. Its chapters describe the various methods and kinds of dryers in use for various industries, and particularly in agrotechny, including potatoes, beets, grass, green corn, brewer's grains, distillery slop, fertilizers, fruits, vegetables, etc.

The manufacture of compressed dried vegetables, A. Hausner (*Pure Products, 6 (1910), No. 8, pp. 449–453, fig. 1*).—A general description of a process for drying vegetables and packing the resulting products.

Preserving potatoes by steaming and storage, M. Schmoeger (*Fühling's Landw. Ztg., 59 (1910), No. 19, pp. 652–656*).—The author reports an experiment on the storage of steamed potatoes in a pit.

The pit, which was in a sandy loam soil, was 4 meters long, $1\frac{1}{2}$ meters wide at the top, 1 meter at the bottom, and 1 meter high. The potatoes were steamed in a Henze apparatus and placed in the pit, which had been previously sized with lime and water glass, so that they formed a heap about ½ meter above the regular level of the ground. The upper surface of the potatoes was covered over with a thin layer of a lime-water glass cement, and a tube was placed in the center of the mass to provide an opening in which the temperature could be noted from time to time. At the completion of the stack the temperature was from 35 to 40° C. After a few days the heap was covered with from 30 to 40 cm. of soil and during the winter with a layer of potato foliage. After a period of 10 months a loss of 15.2 per cent by weight of the total mass could be noted. The nitrogen-free extractive substances diminished somewhat, particularly starch.

The manufacture, preservation and use of unfermented grape juice, G. C. HUSMANN (*Ann. Rpt. Mo. Bd. Hort., 3 (1909), pp. 134–143, fig. 6*).—This paper treats in a popular way of the food value and composition of unfermented grape juice, the composition of the grape, the causes of fermentation and methods of preventing it, the commercial and home manufacture of must, flavor and quality in grape juice, and the use of unfermented grape juice, sillabub, Bohemian cream, grape nectar, grape punch, grape sherbet, and grape ice cream.

The preparation of wine in Algiers, J. FOUSSAT (*Gouvt. Gén. Algérie, Dir. Agr., Inform. Agr., Bul. 8, pp. 50, figs. 10*).—A brief scientific and practical discussion of the manufacture of wine.

The uses of the defibered pulp of Agave rigida, P. DECHAMBRE, A. HERBERT, and F. HEIM (*Assoc. Franç. Avanc. Sci., Compt. Rend., 37 (1908), pp. 1182–1193*).—The authors report an analysis of the pulp of agaves and draw attention to the possible uses this material may be put to, such as stock feed, fertilizer, etc.

Utilizing agave residues for producing alcohol, F. H. D'HÉRELLE (*Jour. Agr. Trop., 10 (1910), No. 108, pp. 161–167*).—Details are given of the author's experiments in the production of alcohol from agave leave residues (*Agave rigida* var. *sisalana*), etc., in Mexico.

Saccharification of cell substance, H. OST and L. WILKENING (*Chem. Ztg., 34 (1910), No. 52, pp. 461, 462*).—Experiments in regard to the use of wood for manufacturing alcohol are reported.

The production of volatile oils and perfumery plants in the United States, F. RABAK (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 195, pp. 55, figs. 5*).—This bulletin deals chiefly with the possibilities of cultivating volatile oil and perfumery plants in the United States. In it are discussed the growth, cultivation, and harvesting of perfume plants, aroma of plants, as to the nature of the odors and their localization, the development of the aroma, and the extraction of the aroma with volatile solvents, and liquid and solid fats. The methods of obtaining the odoriferous bodies, such as by steam distillation and expression, are considered, with the apparatus utilized therefor, and the methods of handling it. The after-handling of the oils is treated at length, especially the purification, separation, filtration, drying, and the preserving of the product. Data as to the yield of oil from peppermint, bergamot mint, and wormwood at various stages of development are also reported, in which it was found that the odor was developed during the advance in growth and the approach of the flowering period.

The bulletin shows that the cultivation of perfume-yielding plants has been very limited in the United States and chiefly confined to a few kinds of plants. A possibility exists as regards the climate of duplicating a certain part of the perfumery industry which is carried on in Europe to-day. The author, however, points out that much experimental work will be required in this direction in this country for finding suitable localities for certain plants and, further, as to the establishing of proper labor conditions and transportation facilities. The commercial aspect of the industry is also considered.

Technical-microscopical differentiation of fibers, R. KORN (*Jahresber. Ver. Angew. Bot., 7 (1909), pp. 189–234, pls. 2, figs. 12*).—This investigation has particular reference to microscopy, chemistry, micro-chemistry, and the optical behavior of hemp and linen fibers.

Philippine fibers and fibrous substances;—their suitability for paper making, G. F. RICHMOND (*Philippine Jour. Sci., A. Chem. and Geol. Sci., 5 (1910), No. 4, pp. 233–255*).—A demonstration is given in regard to the feasibility of producing paper from Philippine bamboo. The cost of production is stated.

METEOROLOGY—WATER.

Department of meteorology and climatology, J. E. CHURCH, Jr. (*Nevada Sta. Bul. 72, pp. 49–57*).—In continuation of previous work (E. S. R., 21, p. 14), an account is given of the establishment and equipment of the observatory upon Mount Rose for the study of the forecasting of frost from mountain tops, and of the inauguration of inquiries on the relation of forests to the conservation of snow. Preparations for observations at the base of Mount Rose, 6,000 ft. below the summit observatory, and for studies of the upper air by means of kites, are also referred to.

Observations on the relation of forests to the conservation of snow were made on Mount Rose, in the basin of Lake Tahoe, and elsewhere. Measurements of the snowfall are made by means of Bigelow's snow bins and a snow sampler and weigher specially devised for the purpose. The latter "consists of a piece of machine seamless tubing, somewhat under 2 in. in its external diameter, and having an inside diameter sufficient to receive a cylindrical cutter with orifice 1½ in. in diameter. A scale of inches is cut upon the exterior of the tube. The essential feature of the sampler is the detachable cylindrical cutter and the commodious tube above, which permits the core of snow to rise with minimum friction. Since snow packs under pressure with great readiness, it is of the utmost importance to give the snow passing upward through the cutter the utmost possible room to postpone its adhering to the interior of the tube, and thus increase the depth to which the sampler can be driven. The interior of the cutter also increases in diameter upward from its orifice to decrease the effect of packing at the point as well. The weight or moisture content of the snow is determined by weighing the sampler and contents by means of a spring balance and then subtracting the weight of the sampler empty. The depth of snow is ascertained by aid of the scale engraved upon the outside of the sampler, and its relative density per inch by dividing the weight by the depth, the diameter of the cutter being constant, namely, 1½ in. The snow core is removed by inverting the tube and permitting the snow to slide out, which it will do very readily when the instrument is not frosty. In case the snow adheres, the core can be broken up by means of a pick plied through a series of longitudinal slots cut throughout the length of the tube. In case of depths beyond the usual, extra sections can be screwed into the sampler, and the driving and weighing continued until the bottom of the snow is reached. These extra sections should contain the continuation of the scale engraved upon the sampler, but need contain no slots. The last scale reading will represent the total depth, and the sum of the net weights the total net weight of the snow. In case a large field of snow is measured and water contents estimated, drivings are made every 50 paces, or less if desired, once or more over the length and breadth of the field, and the average of the several weighings computed."

Can the rainfall up to the end of October be used in predicting the temperature of the coming winter? F. STÄNDER (*Wetter, 27 (1910), No. 9, pp. 203–206*).—From a study of data covering long periods at Berlin, Frankfurt, and Cleves, the author concludes that from the temperature and precipitation (not precipitation alone) of August, September, and October, the character of the succeeding winter may be predicted with reasonable certainty.

On the possibility of forecasting the approximate winter rainfall for northern Victoria, E. T. QUAYLE (*Commonwealth Bur. Met. Melbourne Bul. 5, pp. 7, pls. 2*).—From a study of monsoonal disturbances and of mean pressure and temperature the author concludes "that low mean pressures and high mean temperatures during the summer months are more likely than not to be followed by winter rains above average."

In the method used for predicting the approximate winter rainfall "double weight is given to the monsoonal depressions as compared with pressure and temperature, which may be taken as of equal value for forecasting purposes. The mean departures from the normal are for the pressure ±0.023 in., for the temperature ±0.9°, and for the number of monsoonal depressions ±2.6. If, now, to the figures for the monsoonal departures we add those for the pressure in hundredths of an inch, multiplied by −0.6, and those for temperature multiplied by +1.4, we get combined results with + or − sign, which are a considerable modification of those for the monsoonal departures, naturally tending to numerical exaggeration when all are in agreement. The factors used for the pressure and temperature departures are the multipliers necessary to make them equal the mean monsoonal departures, but divided by 2 on account of the weights. . . .

"The signs of the numbers obtained in this way are in agreement with those for the departures from normal of the following winter rains no less than nineteen times out of twenty-two and in serious disagreement only twice."

In the author's opinion the results point to the possibility of issuing a winter forecast for northern Victoria at least by the end of April and often by the beginning of that month.

Meteorological observations at the Massachusetts Agricultural Experiment Station, J. E. OSTRANDER and C. M. DAMON (*Massachusetts Sta. Met. Buls. 263, 264, pp. 4 each*).—Summaries of observations on pressure, temperature, humidity, precipitation, wind, sunshine, cloudiness, and casual phenomena during November and December, 1910, are presented. The general character of the weather for November is briefly discussed, and the December bulletin gives a summary for the year. The principal data in this summary are as follows:

Pressure, reduced to freezing and sea level (inches).—Maximum, 30.87, January 4; minimum, 29.11, January 29; mean, 30. *Air temperature*, in ground shelter (degrees F.).—Maximum, 97, July 24; minimum, −9, January 5; mean hourly, 47.4. *Humidity*.—Mean dew-point, 38.3; mean relative humidity, 76. *Precipitation*.—Total rainfall or melted snow, 36.11 in.; number of days on which 0.01 in. or more rain or melted snow fell, 117; total snowfall, 44.5 in. *Weather*.—Total cloudiness recorded by sun thermometer, 1,661 hours, or 37 per cent; number of clear days, 142. *Bright sunshine*.—Number of hours recorded, 2,793, or 63 per cent. *Wind*.—Prevailing direction, west-northwest; total movement, 59,242 miles; maximum daily movement, 468 miles, November 27; minimum daily movement, 28 miles, January 17; maximum pressure per square foot, 15 lbs., January 3, north-northwest, and February 23, west-northwest.

Dates of frost.—Last, May 6; first, September 23. *Dates of snow.*—Last, March 14; first, October 27.

Report on the work of the station of agricultural climatology of Juvisy during 1909, C. Flammarion (*Bul. Mens. Off. Renseig. Agr. [Paris], 9 (1910), No. 10, pp. 1133–1149, figs. 6*).—The usual summaries of observations on temperature of the air, soil, and underground water, atmospheric pressure, relative humidity, rainfall, and sunshine and cloudiness are given.

Changes in climate since the last glacial period in Germany, T. Arldt (*Naturw. Rundschau, 25 (1910), Nos. 47, pp. 599–602; 48, pp. 611–614*).—Recent contributions to the subject of changes of climate during different geological periods are reviewed.

The fertilizing value of rain and snow, F. T. Shutt (*Canada Expt. Farms Rpts. 1910, pp. 216–218*).—This is a brief report of a continuation of previous investigations (E. S. R., 22, p. 316), summarizing the results for the three years ended February 28, 1910.

The amounts of nitrogen brought down to the soil in rain and snow during the three years were 4.323, 8.364, and 6.869 lbs. per acre respectively. Approximately 85 per cent of the total nitrogen was furnished by the rain and 15 per cent by the snow. Of the total nitrogen, approximately 65 per cent was free and organic ammonia and 35 per cent nitrates and nitrites.

The constitution of water (*Trans. Faraday Soc., 6 (1910), No. 1, pp. 71–123, figs. 13; abs. in Chem. Trade Jour., 46 (1910), No. 1199, pp. 478, 479*).—This is a series of papers bearing on this subject presented before the Faraday Society as follows: Is Water an Electrolyte? by P. Walden; The Chemical Nature of Molecular Association—A Special Study of the Case of Water, by P. A. Guye; Liquid Water a Ternary Mixture—Solution Volumes in Aqueous Solutions, by W. R. Bousfield and T. M. Lowry; and The Specific Heat of Ice, Water, and Water Vapor, by W. Nernst. General discussion of the subject by various investigators is also reported.

The genesis and function of the dew-pond, H. Gibson (*Symons's Met. Mag., 45 (1910), No. 532, pp. 63–67; Jour. Roy. Soc. Arts, 58 (1910), No. 3011, pp. 847–849*).—The author maintains in this article that the term dew-pond is a misnomer and that the water collected in such ponds is derived from rain. He discourages the construction of dew-ponds.

The dew fiction, H. Gibson (*Pastoralists' Rev., 20 (1910), No. 4, pp. 403–405*).—This article sets forth the same views as those noted above.

Dew-ponds, W. G. Cox (*Pastoralists' Rev., 20 (1910), No. 6, pp. 645, 646, fig. 1*).—The author recommends the trial of dew-ponds in Australia.

Bacteriological standards in water analysis, E. J. McWeeney (*Jour. Roy. Sanit. Inst., 31 (1910), No. 7, pp. 263–276*).—In the author's opinion a complete routine bacteriological analysis should include determinations of (1) physical properties, (2) general germ content, (3) content in organisms of presumably intestinal origin, and (4) microscopic examination of the sediment. He describes standard characters of 1 cc. gelatin and agar plates for (1) pure water, (2) dirty water, and (3) sewage.

Water analyses, S. C. Dinsmore (*Nevada Sta. Bul. 72, pp. 40–44*).—Mineral analyses of the water supply of six towns in Nevada are reported. In three cases the water was obtained from wells.

The water supply of farm homesteads, F. T. Shutt (*Canada Expt. Farms Rpts. 1910, pp. 218–221*).—Analyses of 79 samples of water are reported, of which 31 were considered wholesome, 26 suspicious, 11 seriously contaminated, and 11 saline. Attention is called to the unwholesome condition of much of the farm water supply, but it is stated that over the larger part of the Dominion it is by no means a difficult matter to obtain a good supply in sufficient abundance for house and stock use.

Water supply for country homes, K. A. McVey (*Univ. Mo. Engin. Expt. Sta. Bul. 2, pp. 35–54, figs. 5*).—"It is the purpose of this bulletin to outline some methods of water supply, draw attention to the importance of the sanitary aspect of the supply, and to give an idea of the cost of making such improvements." The bulletin deals with springs, wells, and cisterns as sources of supply, and describes various methods of making the supply available in the house. The possibility of introducing plumbing into houses already built is also discussed.

Potable water supply for rural communities, A. Theunis (*Rev. Gén. Agron., n. ser., 5 (1910), Nos. 9, pp. 353–360; 10, pp. 397–411*).—This is a report presented to the Superior Council of Agriculture of Belgium, dealing with the character of the rural water supplies in that country and their improvement. It is based upon a wide study of these supplies.

It is stated that the greater part of the well waters are contaminated and unfit for human use, and that these contaminated waters are the cause of various diseases, particularly typhoid fever. The report makes the general recommendation that wells and local sources of water supply be abandoned and that the supplies for the different communities be brought from a distance where there is less danger of contamination.

Sterilization of polluted water by ultraviolet rays at Marseille, France (*Engin. News, 64 (1910), No. 23, p. 633, fig. 1; Engin. Rec., 62 (1910), No. 24, p. 672, fig. 1*).—An apparatus, which sterilized 1,330 cu. ft. per kilowatt hour, is described.

Bacterial purification of sewage waters, Mahieu (*Ann. Ponts et Chaussées, 8. ser., 47 (1910), pt. 1, No. 5, pp. 87–133, pls. 4, figs. 6*).—Various methods used in purifying the sewage of Paris before it is discharged into the Seine are described, and the efficiency of the methods is discussed.

Sanitation and sewage disposal for country homes, W. C. Davidson (*Univ. Mo. Engin. Expt. Sta. Bul. 3, pp. 55–72, figs. 6*).—This bulletin explains the necessity for home sanitation and describes systems and methods adapted to the country home, including methods of disposing of dry sewage, the use of cesspools and septic tanks, sewage irrigation, and discharge into running streams. A system of plumbing adapted to country houses is described.

A new method of handling sewage sludge, K. Imhoff and C. Saville (*Engin. Rec., 62 (1910), No. 24, pp. 673–676, figs. 12*).—A system in use in the Ems district of southwestern Germany, in which the sludge is separated out and allowed to decompose in deep wells under water pressure which holds the gases produced during decomposition in the sludge, is described. The sludge is dried on beds, yielding a material which is considered much more valuable as a fertilizer and for general use than ordinary sludge.

SOILS—FERTILIZERS.

Soils and fertilizers, T. Dietrich, C. Schaetzlein, and A. Stift (*Jahresber. Agr. Chem., 3. ser., 12 (1909), pp. 38–175*).—This is a review of recent scientific literature on these subjects similar to those of previous years.

The use of photography in agronomy, and especially in the study of soils, J. Schroeder (*Agros, 2 (1910), No. 1, pp. 4–14, figs. 7*).—The great value of photography as a means of preserving a permanent record of physiographic conditions, character and condition of soils, and growth of plants is discussed and illustrated.

Soil classifications and adaptations, J. L. Hills, C. H. Jones, and P. A. Benedict (*Vermont Sta. Bul. 154, pp. 703–743*).—This article discusses the four principal soil classifications which have been proposed, as follows: (1) That developed by Merrill and based upon the origin and method of formation of the soil, (2) that based upon physical characteristics of the soil, (3) that suggested by Snyder and based mainly upon the use to which soils are put, and (4) that employed by the Bureau of Soils of this Department and based upon its soil surveys in different parts of the United States. Soil adaptations are discussed in their relations to size of soil particles and methods of soil formation and deposition, as well as on the basis of personal observations in the course of soil surveys. A glossary of technical terms and a list of the principal authorities consulted are given.

Physical analysis of soils, E. A. Mitscherlich (*Ztschr. Angew. Chem., 23 (1910), No. 39, pp. 1840, 1841, fig. 1; Chem. Ztg., 34 (1910), No. 113, pp. 1006, 1007; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 20, p. 1217*).—It is stated that in determining the size of soil particles the mechanical analysis by the sieve and sedimentation method has given no positive results because it does not account for the differences in form, in specific gravity, and in colloidal structure of the soil particles. For similar reasons microscopic examination does not serve the purpose. As determined by the author's method the soil surface furnishes a measure of the fineness of the soil type, without, as is the case in the sieve and sedimentation method, presupposing a definite form and the same specific gravity of the soil particles.

In his method the author distinguishes between the outer and the inner surface of the soil, both being wetted with water but only the outer one with organic liquids of high molecular weight.

To determine the hygroscopicity and the outer soil surface the air-dried soil is exposed over 10 per cent sulphuric acid in a vacuum desiccator and after vapor tension equilibrium weighed, then dried for 4 hours over phosphoric anhydrid at 100° C. and weighed, and finally placed over a 15 to 25 per cent benzol oil mixture and after vapor tension equilibrium again weighed. The first weighing after deducting the weight of the dry soil (second weighing) gives the total soil surface (hygroscopicity) in percentage of the dry soil. The last weighing multiplied by 3.86 gives the outer soil surface. The total surface is a measure of the productivity, while the outer surface relates to the mechanical state of the soil and is indicative of the ease of working.

A series of pot experiments with mustard on a mixture of sand with varying quantities of peat was made to show the relation between the yield and the total surface or hygroscopicity as determined by the above method. From the results obtained the author deduces the following equation for determining the relation between yield (y) and hygroscopicity (x): $\log (60-y)=1.4-1/24x$.

The mechanical analysis of soils in Buitenzorg, Java, E. C. J. Mohr (*Bul. Dept. Agr. Indes Néerland., 1910, No. 41, pp. 33, pl. 1; Teysmannia, 21 (1910), No. 7, pp. 455–471, pls. 3*).—The author calls attention to the fact that on account of the rapid changes which go on in soils in tropical countries like Java mechanical analysis at any given time is of less value than in case of soils of temperate regions. It is more necessary in the former case to follow closely the changes going on in the soil.

The methods used (based to a large extent upon those of the Bureau of Soils of this Department) are described as well as methods of stating and interpreting the results. Classification by means of an equilateral triangle, the three points of which are sand $>50\mu$, dust 50–5μ, and finest particles $<5\mu$, is explained. The author is of the opinion that determination of hygroscopicity by the Mitscherlich method often furnishes a simpler, more practical, and more exact basis for classifying soils.

Bibliography of North American geology for 1909, with subject index, J. M. NICKLES (*U. S. Geol. Survey Bul. 444, pp. 174*).—This bibliography is arranged on the same plan as those for previous years. It contains references to a number of important articles on soils, phosphates, and other minerals of agricultural importance.

Mineral resources of Virginia, T. L. WATSON (*Lynchburg, Va., 1907, pp. XXXI+618, pls. 83, figs. 101*).—This handbook, prepared in connection with the Jamestown Exposition, is based mainly upon the work of Rogers and Hotchkiss, the United States Geological Survey, and the Geological Survey of Virginia, "conducted jointly for two years by the board of visitors of the Virginia Polytechnic Institute and the state board of agriculture." It contains sections on the following minerals of special agricultural importance: Limestone, feldspars, phosphates, nitrates, gypsum, and marl.

General classification of Florida soils (*Fla. Quart. Bul. Agr. Dept., 20 (1910), No. 2, pp. 27–38*).—Soils of the following general classes are described: Second and third rate pine lands, high hammock, low hammock, and swamp soils.

Notes on the soil occurring in the area served by the Barren Jack irrigation scheme, F. B. GUTHRIE (*Agr. Gaz. N. S. Wales, 21 (1910), No. 8, pp. 663–666*).—A general description and results of physical and chemical analyses of four classes of soils of this region are given, and the agricultural possibilities of each class are discussed. The chemical analyses show relatively low contents of humus and nitrogen.

Report on the sand dunes of New Zealand, L. COCKAYNE (*Wellington, N. Z.: Dept. of Lands, 1909, pp. 30, pls. 9*).—This report deals in detail with the area, geology, and botany of these dunes, which occupy over 300,000 acres of land.

The Demerara soil problem (*Internat. Sugar Jour., 12 (1910), Nos. 136, pp. 168–171; 137, pp. 228–231; abs. in Chem. Abs., 4 (1910), No. 16, p. 2177*).—It is pointed out that the system of continuous cane growing, the absence of any attempt to maintain the humus supply of the soil, and the concentration of subsoil drainage water are rapidly unfitting the land for future use. To place the cultivation in a satisfactory position it will be necessary to change the system of planting, to adopt mechanical tillage, and to introduce a system of green manuring and crop rotation.

Studies of the changes occurring in heated soils, S. U. PICKERING (*Jour. Agr. Sci., 3 (1910), No. 3, pp. 258–276, figs. 5; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 20, p. 1217*).—In previous investigations (E. S. R., 20, p. 1015) it had been shown that soils heated to from 60 to 150° C. developed a soluble organic substance which was toxic to the germination of seeds. In the investigations here reported a further study was made of the character of this substance and of the changes which it undergoes when kept under various conditions. This study was preceded by an inquiry as to the trustworthiness of the determination of soil extracts.

"The water extracts obtainable from soils are of constant composition as regards organic matter when the time allowed for the extraction varies from 20 to 320 minutes, the temperature from 7° to 23°, and the proportions from 5 to 10 of soil to 100 of water. The inorganic matter is not affected by the time, but is by the temperature and proportions.

"The increase in soluble matter produced by heating a soil, and the accompanying toxic qualities toward the germination of seeds in it, is gradually reduced by exposing these soils in a moist condition to the air, even under aseptic conditions, but is not reduced when the soils are kept moist in the absence of air. The destruction of the toxic substance is probably, therefore, due to oxidation.

"Unheated soils, or soils heated only to a low temperature, exhibit on keeping an increase in soluble matter; this occurs whether air is admitted or not, and this change, therefore, is probably not an oxidation process. The substance formed, moreover, in such cases appears to have little or no toxic action on germination. This increase of soluble matter, due to the formation of a nontoxic substance, is preceded by a preliminary diminution of soluble matter, precisely similar to the diminution of toxic matter occurring continuously in the more highly heated soils. Such toxic matter, therefore, appears to be present in all soils, whether heated or not, though, in the latter case, it is present in such small quantities that it soon becomes completely oxidized.

"Air-dried soils, heated and unheated, when kept for some months show an appreciable reduction in soluble constituents, and also in toxic properties (where such properties were originally present), closely similar to the reduction exhibited by moist soils kept in air for about ten days."

Plant growth in heated soils, S. U. Pickering (*Jour. Agr. Sci., 3 (1910), No. 3, pp. 277–284, pls. 3; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 20, p. 1217*).—Pot experiments with various plants grown on heated soils are reported.

The author states that "however contradictory the results may appear at first sight, they are fully in accord with the information obtained from a study of the changes occurring in heated soils and with the experiments on the germination of seeds. On heating a soil, the soluble matter available for nutrition is increased and changes in the bacterial condition are brought about, which—the latter especially—conduce to increased vigor of the plants growing in them; but the heating also results in the formation of some substance or substances which are actively toxic and which tend to arrest growth. The proportion of toxin formed at low temperatures is small and is generally insufficient to counteract those conditions favoring increased growth, but this proportion increases at a very rapid rate as the temperature of heating rises above 100° and its baleful influence in such soils is generally the preponderating factor. Hence the results obtained of increased vigor with soils heated up to about 100°, and of greatly decreased vigor with those heated to higher temperatures. But the toxic substance is unstable and gradually disappears by the action of air and moisture, so that the results obtained in any individual series will vary considerably with the circumstances obtaining. When the soils are used at once after heating, and when the cultivation and the access of air are reduced to a minimum, the toxic action will prevail and no increased vigor of growth may obtain in any case; whereas, under conditions favoring oxidation, the toxic action disappears and increased growth becomes the predominant feature. The gradual recovery of plants grown in strongly heated soils, and the smallness of the toxic action in the case of second crops, are illustrations in point."

The experiments did not show whether the substance which was toxic toward plant growth was the same as that which was toxic toward germination, although the indications were that it was the same toxin which was active in both cases. The experiments showed wide differences in the susceptibility of different plants to the action of the toxin. Many of the grasses were much less susceptible than other plants. The formation of the toxic body was traced down to such a low temperature of heating "that it is impossible to avoid the conclusion that some of it must be present in so-called unheated soils."

The moisture content of packed and unpacked soils, F. T. Shutt (*Canada Expt. Farms Rpts. 1910, pp. 214, 215*).—Comparative tests of the subsoil packer on two experimental farms are reported. The results were not conclusive, but indicate "no very great advantage from the use of the subsurface packer."

The contest for water between soil and seed, A. MÜNTZ (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 19, pp. 790–793*).—Experiments with wheat in soils of different kinds under varying conditions of moisture are reported, showing that the seed and the soil struggle for the possession of the water until an equilibrium is reached which depends upon the specific affinities of the two for water, and that not until this affinity is satisfied in case of the soil can the grain germinate. These results confirm the author's broad conclusion that vital processes in general are to a large extent a continuous struggle for water between the living organism and the medium in which it grows.

The nitrogen and humus problem in dry-land farming, R. STEWART (*Utah Sta. Bul. 109, pp. 3–16*).—This bulletin reports results of studies of the humus and nitrogen content of virgin soils and contiguous soils which have been dry farmed (by continuous cropping or with summer fallowing) for different lengths of time in the Cache Valley. The conclusions reached were as follows:

"The cropping of dry-farming land in Cache Valley to wheat, either by the summer fallowing method or by continuous cropping, does not decrease the nitrogen or humus of the surface foot of soil.

"The second foot of grain-cropped land contains less nitrogen and humus than does the second foot of the adjacent virgin soil.

"The cropping of dry-farming land to alfalfa causes a decrease of the nitrogen and humus over that of the adjacent virgin soil.

"The observed phenomenon in case of the grain-cropped land is probably due to the addition of nitrogen to the surface foot from lower depth and the addition of the humus from the added straw.

"The work of this bulletin indicates that in a study of the nitrogen problem in dry farming attention must be paid to greater depth of soil than the traditional plowed surface."

The nitrogen and humus problem in dry-land farming, R. STEWART (*Jour. Indus and Engin. Chem., 2 (1910), No. 9, pp. 386–388*).—A brief account of the above investigations.

The humus acids of peat moss, W. BERSCH (*Ztschr. Moorkultur u. Torfverwert., 8 (1910), No. 4, pp. 204–214*).—This article is based upon investigations by Baumann and Gully which have already been noted (E. S. R., 23, p. 715).

The mineralogical significance of pot experiments, J. SAMOJLOW (*Centbl. Min., Geol. u. Paläontol., 1910, No. 9, pp. 257–262, figs. 2; abs. in Chem. Zentbl., 1910, I, No. 26, pp. 2132, 2133*).—The object of the study here reported was to show how pot experiments may be used to determine the chemical constitution of the minerals which furnish plant food in the soil.

In culture experiments with *Aspergillus niger* potash was supplied in the form of finely powdered orthoclase, microcline, muscovite, and biotite. The potash of all of these minerals was assimilated to some extent, but much better growth was obtained with muscovite and biotite than with orthoclase and microcline.

The various minerals were tested as sources of potash in pot experiments with wheat, buckwheat, and vetch. In a comparison of the easily weathered orthoclase with the more resistant microcline better yields were often obtained with the latter than with the former, and in no case was the yield with the microcline less than that with the orthoclase.

Vetch made better growth on sanidine than on orthoclase but very poor growth on leucite. The potash resulting from the weathering of microcline circulated more readily in the soil than that of orthoclase. The potash of apophyllite was much less available than that of orthoclase, and the potash of phillipsite was more readily assimilated than that of either. The potash of the phillipsite was readily split off from the zeolites.

The results thus obtained show that pot experiments may throw new light on the chemical constitution of minerals and on the bearing of various stages of weathering on the assimilation of the plant food.

Relation of pot experiments to the active phosphoric acid of the soil, G. S. FRAPS (*Jour. Indus. and Engin. Chem., 2 (1910), No. 8, pp. 350–352*).—Active phosphoric acid is defined in this article as that which is extracted by 2,000 cc. of fifth-normal nitric acid from 200 gm. of soil in 5 hours at 40° C. The conclusions drawn from four years' pot experiments with a large number of Texas soils are as follows:

"Soils containing 20 parts per million or less of active phosphoric acid are highly deficient in pot experiments.

"Soils containing from 30 to 100 parts per million of active phosphoric acid are deficient, as a rule, in pot experiments, and the extent of their deficiency is related to the quantity of active phosphoric acid in them.

"Soils containing 100 to 300 parts per million of active phosphoric acid may or may not prove deficient in pot tests, the chances being even.

"The quantity of phosphoric acid removed by the crop grown in our pot experiments is on an average closely related to the quantity of active phosphoric acid.

"The phosphoric acid removed from the soil by the crop comes from other sources in addition to the active phosphoric acid."

Relations between the fertility of the soil and the phosphoric acid soluble in water, I. POUGET and D. CHOUCHAK (*Assoc. Franç. Avanc. Sci., Compt. Rend., 37 (1908), pp. 1195–1199*).—This is a brief account of investigations which have been reported in full elsewhere (E. S. R., 23, p. 519).

On the interaction of potash and lime, NIGGL (*Illus. Landw. Ztg., 30 (1910), No. 76, pp. 719, 720; Bl. Zuckerrübenbau, 17 (1910), No. 20, pp. 332–335*).—Field experiments by Christmann are referred to as showing the intimate relation which exists between the action of potash and of lime in the soil.

A method for the study of soil fertility problems, J. G. LIPMAN (*Jour. Agr. Sci., 3 (1910), No. 3, pp. 297–300, fig. 1; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 20, p. 1218*).—A method for the study of the reciprocal effects of legumes and nonleguminous plants is described. This consists in growing the nonleguminous plants in soil in a porous pot surrounded by earth in a larger glazed earthenware pot in which leguminous plants are grown. Experiments with this device compared with a similar arrangement in which a nonporous inner pot was used indicated that soluble nitrogenous compounds diffused through the unglazed porous wall of the inner pot and were utilized by the oats growing in this pot. Various uses which may be made of this method in soil investigations are pointed out.

Work of the chemical laboratory, B. WELBEL (*Godichnyĭ Otchet Ploti. Selsk. Khoz. Opytn. Stantsïi, 15 (1909), pp. 119–148, 166–169, pls. 3*).—A continuation of previous investigations (E. S. R., 22, p. 523) on the influence of fallow, manures and fertilizers, and growth of cereals and legumes on soil fertility, particularly on the balance of nitrogen and phosphoric acid in the soil, is reported.

The results in 1909 confirmed those obtained the previous year. Fallowing increased the amount of assimilable nitrogen and phosphoric acid; culture of cereals did not greatly decrease the assimilable phosphoric acid of the soil; and the culture of legumes increased the assimilable nitrogen but greatly decreased the assimilable phosphoric acid. As a solvent for determining the available phosphoric acid the author uses weak nitric acid (5 cc. of nitric acid of 1.4 sp. gr. to 5 liters of distilled water). Satisfactory agreement was obtained between the results secured by this method and those of pot and field experiments.

The effect of earthworms on soil productiveness, E. J. RUSSELL (*Jour. Agr. Sci., 3 (1910), No. 3, pp. 246–257, figs. 2*).—Pot experiments are reported in which various crops were grown on soil to which earthworms were added and on soil from which they were excluded.

The results indicate that "earthworms do not appear to have any marked direct effect on the production of plant food. Organic matter seems to decompose with formation of nitrates equally quickly whether they are present or not. They are rich in nitrogen, containing about 1.5 to 2 per cent, and they decompose rapidly and completely; thus they furnish a certain amount of plant food to the soil when they die. Their chief work is to act as cultivators, loosening and mulching the soil, facilitating aeration and drainage by their burrows."

The influence of stubble burning on the fertility of the soil, A. J. EWART (*Jour. Dept. Agr. Victoria, 8 (1910), No. 10, pp. 646, 647*).—It is stated that stubble burning not only decreases the amount of humus returned to the soil, but also accelerates the exhaustion of that already present in it. This decrease in the carbohydrate material diminishes the food supply of the Azotobacter, causing a decrease in their numbers and thus diminishing the nitrogen supply added to the soil from the air.

Changes in soils through forestation of cultivated lands, FRICKE (*Ztschr. Forst u. Jagdw., 42 (1910), No. 5, pp. 259–264*).—This article reports the results of studies on the influence of forestation of cultivated lands, investigations having been made to determine the effect of forestation on composition, hygroscopicity, percentage of carbon dioxid, humus, and nitrogen of the soil.

There was no gain in the humus content of the forest surface soil over that of the cultivated soil, and no appreciable difference in texture. The vegetative layer or forest débris increased in humus content with the age of the forest The forest débris is a source of nitrogen for the present generation of trees, but it is of no value to the succeeding generation of trees unless it be incorporated into the soil by means of cultivation.

Fatigue of the soil, H. ROUSSET (*Nature [Paris], 38 (1910), No. 1911, pp. 86–90, figs. 5; Engrais, 25 (1910), No. 18, pp. 496–499*).—A review is given of recent investigations bearing upon this subject, particularly those of the Bureau of Soils of this Department.

The story of the soil, C. G. HOPKINS (*Boston, 1911, pp. 350, pls. 8*).—In this book an attempt is made to present certain scientific facts relating to the soil and its improvement in the form of popular fiction. The author states that the story rests upon a "basis of absolute science and real life." It discusses current theories of soil fertility and sets forth in popular way the author's well known views regarding the permanent improvement of poor or exhausted lands, such as those of the Atlantic seaboard and of southern Illinois, which are more fully presented in technical form in the author's treatise on Soil Fertility and Permanent Agriculture (E. S. R., 23, p. 17).

Fertilizer experiments, W. SCHNEIDEWIND ET AL. (*Landw. Jahrb., 39 (1910), Ergänzungsb. 3, pp. 20–109; abs. in Chem. Zentbl., 1910, II, No. 6, p. 404*).—Accounts are here given of plat tests of nitrogenous, phosphatic, and potash fertilizers with and without the addition of stable manure, the action and value of stable manure, the utilization of the plant food of commercial fertilizers and stable manure, soil robbery and increase of plant food, the amounts of lime and magnesia taken up by different cultivated plants, the action of green manures and the utilization of the nitrogen of such manures, the comparative action of sodium nitrate, ammonium salts, lime nitrogen, and Norwegian nitrates, the comparative action of kainit, 40 per cent potash salt, and phonolite, and special fertilizers for the production of beet seed.

These experiments have been carried on since 1902, the crops grown including sugar beets, barley, wheat, oats, and potatoes. A large amount of data bearing upon the effects of the various fertilizer and manure combinations are given in tables.

The results show in general that manure alone was a very effective fertilizer and that profitable increases in yield were obtained with various combinations of the commercial fertilizer. In the case of root crops, especially, the highest yields were obtained by the addition of mineral fertilizers to the stable manure. The yield was also increased in this way in the case of barley following beets.

The sugar beets assimilated the highest percentage of the plant food of the fertilizers, potatoes being second in this respect. However, assimilation of plant food and increase in yield did not run parallel. The potash of the stable manure was more thoroughly assimilated than the nitrogen and phosphoric acid, these being taken up in about equal proportions.

On the fallow plats there was a decided loss of nitrogen notwithstanding the application of stable manure and mineral fertilizers. There was a loss of potash where either mineral fertilizer or stable manure was applied alone, but an increase when a combination of the two was used. There was an increase in the phosphoric acid in all cases. Green manures gave an increased yield in every case, and the addition of nitrogenous fertilizers to the green manure gave no result except in case of beets.

The best results were obtained with sugar beets by plowing the land as early as possible, but with potatoes it was best to leave the land fallow until fall. It is thought that this difference is due to the depth to which sugar-beet roots penetrate into the soil, enabling this crop to reach the nitrogenous compounds washed into the lower soil, and which in the case of potatoes would be unavailable on account of the shallow roots of this crop.

In comparative tests of different forms of nitrogenous fertilizers ammonium sulphate was 90 per cent as effective as sodium nitrate in increasing the yield, although the percentage of nitrogen assimilated from the ammonium salt was only 82 per cent of that utilized from the nitrate. The Norwegian (basic) lime nitrate was 96 per cent as effective as sodium nitrate in increasing the yield, and the assimilation of the nitrogen of this material was slightly greater (103 per cent). The lime nitrogen gave poor results on sand and sandy clay loams, but good results on better kinds of soils, except in the case of beets.

The best results with the nitrogenous fertilizers were as a rule obtained from top-dressing in the spring. With fall application there is likely to be a considerable loss of nitrogen. Lime nitrogen, however, may be used in the fall with better results than sodium nitrate or ammonium sulphate. Sodium nitrate did not reduce the sugar content of beets when applied before June 20.

In comparative tests of phonolite and potash salts on potatoes and sugar beets the phonolite had little or no effect, while potash salts increased the yields materially. The phonolite, however, did not decrease the starch content of the potatoes, as was the case with the potash salts, but, on the other hand, slightly increased it.

Tests of sodium nitrate on beets grown for seed gave inconclusive results.

The loss of nitrogen in stable manure, B. Niklewski (*Fühling's Landw. Ztg., 59 (1910), No. 21, pp. 752–760*).—The author refers to the difference of opinion among investigators as to whether nitrification goes on in stable manure, and reports investigations from which he concludes that there may be considerable nitrification in manure under certain conditions, particularly in loose heaps insufficiently supplied with moisture. There was no indication of nitrification in manure in deep stalls, and the process was reduced to a minimum in well-compacted heaps kept moist with water or liquid manure. The author questions whether it is practicable to preserve and handle the liquid and solid manure separately as has been proposed.

Concerning lime nitrogen and nitrogen lime, König (*Abs. in Deut. Landw. Presse, 37 (1910), No. 34, pp. 375, 376*).—From results of numerous experiments reported in various articles, it is concluded that lime nitrogen readily absorbs water and carbon dioxid from the air, losing more or less nitrogen when stored. The nitrogen lime has a disagreeable odor and is very dusty, thus calling for extreme care in applying it. It may be mixed without injury with potassium salts and Thomas slag, but should not be mixed with superphosphate. Lime nitrogen is not adapted to acid soils (upland moor soils), to soils poor in lime, or to inactive sandy soils, nor should it be used as top-dressing in warm weather. On clay soils and those of high absorptive capacity that contain sufficient lime and have been fertilized with stable manure, lime nitrogen may be used with advantage, the following points being observed:

Lime nitrogen must be applied from 8 to 14 days before seeding. The amount used should not exceed 300 kg. per hectare (supplying about 53.55 lbs. nitrogen per acre). It should be thoroughly incorporated with the soil immediately after broadcasting, being evenly distributed over the land when the surface is not warm or moist to avoid loss of nitrogen.

The action of different nitrogenous fertilizers such as lime nitrogen, lime nitrate, and lime nitrite on moor soil (*Ztschr. Moorkultur u. Torfverwert., 8 (1910), No. 5, pp. 254, 255*).—On moor soils well limed, lime nitrate gave poorer results with oats and oil rape than sodium nitrate. Lime nitrite exerted a positively injurious effect on both limed and unlimed soil and on soil treated with carbonate of potash. These latter experiments were on raw moor soil and better results were obtained on moor soils which had been longer under cultivation. In field experiments with potatoes the results with the nitrite on new moor soil were no better than in pot experiments.

Investigations on the action of humus-silicic acid in sandy soils, A. Stutzer (*Mitt. Deut. Landw. Gesell., 25 (1910), No. 44, pp. 640–642*).—Results of pot experiments with oats to determine the action of humus-silicic acid on nitrogen assimilation with sodium nitrate, using a basal fertilizer of Thomas slag and 40 per cent potash salt on a sandy soil containing lime but poor in humus, showed that there was neither an increase in yield nor a better nitrogen assimilation.

In pot experiments with oats using a sandy soil with a basal fertilizer of Thomas slag, 40 per cent potash salt, iron oxid, and magnesium sulphate, and a top-dressing of calcium nitrate, the soluble silicic acid applied with the addition of soluble carbohydrates gave no increase in nitrogen assimilation.

The nitrates of Chile, L. de Launay (*Nature [Paris], 38 (1910), No. 1944, pp. 199–201, figs. 4; abs. in Rev. Sci. [Paris], 48 (1910), II, No. 12, pp. 372, 373*).—The origin and character of the nitrate deposits are briefly discussed and methods of exploitation are described. It is stated that the richer deposits have already been exhausted and the percentage of nitrate in the crude material is declining. The securing of a sufficient supply of fuel and water for purification of the product is one of the most serious problems connected with the industry.

Aluminum nitrogen (*Monatsh. Landw. 3 (1910), No. 8, p. 264; abs. in Zentbl. Agr. Chem., 39 (1910), No. 9, p. 640*).—A brief description is given of Serpek's method of preparing this compound, which in its simplest form consists of conducting a current of air, deprived of part of its oxygen by passing over glowing coke, through an oven containing a mixture of clay and charcoal heated by electricity. It is claimed that only a small amount of electric energy is necessary in this process.

The industrial fixation of nitrogen, E. Renouf (*Amer. Chem. Jour., 44 (1910), No. 6, pp. 544–555, figs. 3*).—This is a rather full review of a paper by P. A. Guye describing and discussing the fundamental principles and industrial efficiency of the various processes which have been proposed for the electrical fixation of atmospheric nitrogen.

A new phosphatic fertilizer, Palmaer phosphate, Maizières (*Engrais, 25 (1910), No. 24, pp. 657, 658*).—This is a brief account of the method of manufacture and the fertilizing value of this material, accounts of which have already been noted (E. S. R., 23, p. 719).

Notes on the rock phosphate deposits of South Australia, H. Y. L. Brown (*Rpt. Austral. Assoc. Adv. Sci., 12 (1909), pp. 239–244, pl. 1*).—An account is given of the location and character of the various known deposits which are scattered along the Main Range of South Australia for a distance of about 200 miles. It is stated that these deposits are already of economic value, about 24,000 tons of crude rock having been marketed since the discovery of the deposits six years ago.

"A special feature in connection with some of these rock phosphate occurrences is their (apparent) bedded character and interstratification with soft earthy argillaceous and arenaceous and calcareous beds, which are interstratified with the Cambrian limestones, quartzites, sandstones, and other rocks belonging to that series. This is accompanied by evidences of segregations of phosphate as bands and nodular masses in clay and argillaceous material derived from the disintegration of the soft rocks above mentioned. Quartz as small veins, oxids of iron and manganese, are associated in all localities hitherto discovered, indicating to my mind deposition by solution from phosphate-bearing rocks in a similar manner to what is supposed to occur in the formation of lodes."

The world's production of phosphates in 1909, Maizières (*Engrais, 25 (1910), Nos. 19, pp. 516–519; 21, pp. 572–574; 22, pp. 600-602*).—Deposits in different parts of the world—America, Africa, France, Belgium, Oceania, Russia, Spain, and Norway—are briefly described. The production is stated to have been 4,671,458 metric tons in 1909 as compared with 5,087,536 tons in 1908. Of these amounts America consumed 2,013,284 tons in 1909 and 2,221,989 tons in 1908.

Pot experiments with phonolite, and notes on the action of phonolite, L. Hiltner (*Prakt. Bl. Pflanzenbau u. Schutz, n. ser., 8 (1910), No. 3–4, pp. 43–48*).—Phonolite was compared with potash salts, with and without the addition of humus, in pot experiments with horse beans and oats. The results indicate that about one-third of the potash of the phonolite is available during the first year, that the addition of humus greatly increases the availability of the potash of this substance, and that when used in this way it promotes the activity of the nitrogen-assimilating bacteria of the soil.

On the value of ground phonolite as a fertilizer (*Zentbl. Agr. Chem., 39 (1910), No. 4, pp. 224–229; Engrais, 25 (1910), No. 24, pp. 659, 660*).—This is a review of investigations on this subject by E. Wein, P. Wagner, Hiltner, M. Popp, B. Tacke, F. Honcamp, Neubauer, T. Remy, Schneidewind, and von Feilitzen (E. S. R., 20, p. 1022; 22, pp. 324, 325, 718; 23, pp. 24, 719; 24, p. 133).

The use of pyritic earth in agriculture, V. Vera (*Prog. Agr. y Pecuario, 16 (1910), Nos. 684, pp. 419, 420; 686, pp. 452, 453*).—The fertilizing value of this material, which occurs in abundance in many places in Spain and which analysis showed to contain 19.4 per cent of iron sulphid, 1.9 per cent of calcium sulphate, 22.5 per cent of carbonaceous and bituminous matter, and 34 per cent of clay, is discussed.

Water plants as fertilizer, O. OELKER (*Deut. Fischerei Corresp., 13 (1909), pp. 4, 5; abs. in Wasser u. Abwasser, 3 (1910), No. 7, p. 286*).—Analyses of water plants collected from fish ponds are reported, showing that this material compares favorably in composition with fresh stable manure.

Fertilizers, R. E. ROSE and L. HEIMBURGER (*Fla. Quart. Bul. Agr. Dept., 20 (1910), Nos. 2, pp. 40, 41, 45–54, 58–71; 3, pp. 52, 53, 57–66, 70–81; 4, pp. 65, 66, 70–79, 83–91*).—These reports give the section of the state laws providing for inspection of fertilizers, instructions to manufacturers and dealers in fertilizers, market prices and valuation, formulas for vegetables and fruits, and analyses of fertilizers inspected during 1910.

Inspection and analyses of commercial fertilizers, W. F. HAND ET AL. (*Mississippi Sta. Bul. 142, pp. 71*).—This bulletin contains analyses and valuations of 665 samples of fertilizers examined during the season of 1909–10.

About 75 per cent of the fertilizers examined were above guaranty in relative value. The deficiencies were most marked in the case of nitrogen, and especially in high-grade fertilizers, in which the average percentage of nitrogen found was 1.79 while the average guaranty was 1.95 per cent.

Analyses and valuations of commercial fertilizers, C. S. CATHCART ET AL. (*New Jersey Stas. Bul. 233, pp. 43*).—This bulletin contains analyses and valuations of 358 commercial brands of fertilizers, 10 home mixtures, 30 special compounds, and 150 samples of fertilizer supplies.

In 25 samples of nitrate of soda the nitrogen varied from 14.41 to 15.8 per cent, with an average cost per pound of nitrogen of 15.77 cts. The average cost of nitrogen in 6 samples of ammonium sulphate was 15.54 cts. per pound. In 11 samples of dried blood the nitrogen varied from 7.66 to 13.62 per cent and the phosphoric acid from 0.46 to 4.47 per cent. The average cost of nitrogen per pound was 20.25 cts. In 18 samples of dried and ground fish the nitrogen varied from 5.47 to 8.77 per cent and the phosphoric acid from 5.27 to 9.92 per cent. The average cost of the nitrogen per pound was 19.94 cts.

Commercial fertilizers, J. L. HILLS, C. H. JONES, and P. A. BENEDICT (*Vermont Sta. Bul. 154, pp. 635–702, 740–743*).—This portion of the bulletin reports analyses and valuations of 152 brands of fertilizers, representing 14 companies, inspected during the spring of 1910. It is stated that 91 per cent of the brands met their guaranties and not a single brand failed to furnish a commercial equivalent of its guaranty. The materials used to furnish phosphoric acid and potash were of good quality. A tendency toward increased use of low-grade nitrogenous materials was, however, observed. A comparison of analyses of brands for five years shows essential uniformity of composition in some cases but considerable variation in others.

The inspection of cotton-seed meal, W. F. HAND ET AL. (*Mississippi Sta. Bul. 143, pp. 37*).—This bulletin reports analyses and valuations of 407 samples of cotton-seed meal examined during 1910. With very few exceptions the composition was found to be well above the guaranty.

AGRICULTURAL BOTANY.

The conditions of parasitism in plants, D. T. MACDOUGAL and W. A. CANNON (*Carnegie Inst. Washington Pub. 129, pp. III+60, pls. 10, figs. 2*).—After a discussion of dependent nutrition in seed plants, an account is given of investigations on *Krameria canescens* and *K. parvifolia*, two desert shrubs that have hitherto been considered as autophytic. These plants have been found to fasten upon the roots of a dozen or more species near which they habitually grow, but the structure of the roots does not indicate complete parasitism. Further investigations will be necessary to determine whether the parasitism described is characteristic of the genus or whether it is exhibited only by the species growing near Tucson, Ariz.

Following this is an account of experiments on xeno-parasitism, or the enforced nutrition of cuttings of a number of species of plants on different host plants, mostly fleshy cacti. Regenerated cuttings were inserted into the host plants and this relationship maintained for two years or more. The xeno-parasite was found to form roots which penetrated the tissues of the host in some instances, while in other cases absorption took place through the epidermal tissue of the submerged bases of the inserted slips. The development displayed by the xeno-parasites was in all instances less than that of similar shoots autophytically nourished. Successful xeno-parasitism was found to be dependent upon the superior osmotic activity of the parasitic member of the nutritive couple, although not all pairs of plants sustaining such inequality were capable of becoming host and dependent, there being other limiting factors of minor importance. The relative acidity of the sap of two plants appeared to be of no importance in the determination of their capacity to form a nutritive couple. Such plants as the giant cactus (*Carnegica gigantea*) undergo rapid oxidation on injured surfaces and form wound cork so rapidly as to inhibit parasitism, except by species with extremely high osmotic activity, which suffer depletion of their own water balance very slowly and which take solutions from an enforced host against great resistance. Agaves as xeno-parasites were found to form roots so profusely as to destroy the tissues of the host. Experimental arrangements of xeno-parasites were found most successful when regenerated cuttings were inserted in the bodies of the host in a resting condition, in the colder season, with the concentration of the sap increasing, but before the osmotic activity had reached its maximum.

Studies on the development of bulbous plants, G. ANDRÉ (*Bul. Soc. Chim. France, 4. ser., 7 (1910), Nos. 16–17, pp. 865–869; 18–19, pp. 927–933*).—A detailed account of investigations noted elsewhere (E. S. R., 23, p. 229).

A study of elm-tree seedlings showing Mendelian results, A. HENRY (*Jour. Linn. Soc. [London], Bot., 39 (1910), No. 272, pp. 290–300, pls. 5, figs. 2*).—According to the author, there are two well differentiated species of elm in the British Isles, *Ulmus montana* and *U. glabra*. A number of other forms are known which have been given specific names but which are frequently considered as hybrids. Among them is the Huntingdon elm (*U. vegeta*). Studies have been made of seedlings of this tree, about 5,300 in all being raised. A number of these were examined in regard to leaf characters, as to whether they were opposite or alternate, and also regarding their size, and the author concludes that this species is an undoubted hybrid, the seedlings segregating in Mendelian ratios.

Observations on other trees, such as oak, birch, poplar, willow, etc., are given, from which it is claimed that many of the so-called varieties of these trees are hybrids of well-known species.

Male sterility in potatoes, a dominant Mendelian character; with remarks on the shape of the pollen in wild and domestic varieties, R. N. SALAMAN (*Jour. Linn. Soc. [London], Bot., 39 (1910), No. 272, pp. 301–312*).—While studying heredity of color the author noticed the phenomenon of contabescence in potatoes, and he has shown that it is a dominant hereditary character.

A considerable number of varieties of wild and cultivated potatoes were studied in relation to this phenomenon as well as to the character of the pollen. There was found to be no essential difference whatever between the pollen of the wild and domestic varieties, the normal shape of the dry potato pollen being oval. Irregular grains are held to be either aborted or immature and may be taken as a measure of the male sterility of the variety rather than any indication of varietal or specific difference. The presence of irregular grains in the seedlings of *Solanum etuberosum* is held to be no evidence for or against this variety being the parent of the domestic potato. The absence of pollen in the anther is dominant to its presence, and the characters absence and presence of pollen segregate in subsequent generations. The number of living grains in an anther is generally correlated with the total quantity of pollen present. Pale heliotrope potato flowers were always found to be sterile, and, so far as investigated, heterozygous as regards sterility. The later in the season the flowers are examined the more likely is the character of the pollen to deteriorate. Sterility may arise suddenly in an individual member of a family possessing a high degree of fertility.

On right and left handedness in barley, R. H. COMPTON (*Proc. Cambridge Phil. Soc., 15 (1910), No. 6, pp. 495–506, figs. 2*).—In an examination of seedlings of barley, it was found that upon germination the first leaf in some cases overlaps from the right to the left and in others in the opposite direction.

This phenomenon has been studied in relation to inheritance, and the author states that, so far as known, in random collections of barley seeds there will be an excess of seedlings with the first leaf twisted in what may be called the left-handed direction. The ratio of lefts to rights in the variety most accurately studied was close to 1.5:1. So far as observed, the twist of the last leaf below a spike was found to have no influence whatever on the ratio of right-handed to left-handed seedlings produced from that spike. The same ratio occurred among seedlings whether produced from the odd or even rows of seed on the parent head, and no orderly arrangement of seedlings with respect to twist in the first leaf could be detected on the head. The ratio among seedlings in regard to characters of right-handedness and left-handedness indicates that these are not hereditary.

On the nitrogen supply of soils and of plants, with special reference to nitrogen-fixing organisms, B. HEINZE (*Landw. Mitt. Prov. Sachsen, 1910, Nos. 15, pp. 57–59; 18, pp. 69–72; abs. in Centbl. Bakt.* [*etc.*], *2. Abt., 28 (1910), No. 9–11, pp. 269, 270*).—The author first considers the sources of nitrogen in general, such as commercial fertilizers, nitrates already present in the soil, and the action of soil organisms in regard to nitrogen fixation, ammonification, and nitrification. He then discusses more specifically (1) the influence of nitrogen-gathering soil organisms on the supply of available nitrogen in the soil, including the root tubercles of legumes, the free living nitrogen fixing and gathering soil organisms, such as ammonia formers, blue-green algæ, species of Azotobacter, and Streptothrix and Dematium species of soil fungi, and (2) the conditions necessary for making available the soil and organic nitrogen present, such as the addition to the soil of stable manure, soluble phosphoric acid, and lime, thorough cultivation of the soil, high temperature, and a sufficient amount of soil moisture.

A contribution to the biochemistry of soils, R. MOLL (*Beiträge zur Biochemie des Bodens. Inaug. Diss., Leipsic, 1909, pp. 5–8; abs. in Jahresber. Landw., 24 (1909), p. 41*).—The author claims, as the result of his investigations, that the season of the year is the principal factor in determining the biochemical behavior of soils in regard to peptone decomposition, nitrification, nitrogen assimilation, and ammonia and nitrate fixation, and not the kind of fertilizer used or even the weather conditions.

The fixation of nitrogen by free living soil bacteria, W. B. Bottomley (*Proc. Roy. Soc.* [*London*], *Ser. B, 82* (*1910*), *No. B560, pp. 627–629; Chem. News, 102* (*1910*), *No. 2652, p. 155; abs. in Jour. Soc. Chem. Indus., 29* (*1910*), *No. 19, p. 1171*).—Culture experiments with Azotobacter and Pseudomonas showed that these organisms fixed more nitrogen when grown together than when grown separately, and that the mixed culture was more active on limed soil than on unlimed soil. Experiments with different soils showed an increase in nitrogen following inoculation with the mixed culture in all cases.

The amid nutrition of green plants, J. Lefèvre (*Assoc. Franç. Avanc. Sci., Compt. Rend., 37* (*1908*), *pp. 542–544*).—As the result of a series of experiments under sterile conditions, the author confirms his previous conclusions (E. S. R., 18, p. 26) that green plants can assimilate amids in the absence of carbon dioxid.

His experiments here reported were conducted with maize and pine seedlings, and in the case of the former the plants showed considerable increase in their dry weight when grown in Knop's solution containing 0.5 per cent amid. No increase in dry weight occurred in the absence of the amid. It was further found that while growing plants can utilize amids, embryos can not do so.

The production of hydrocyanic acid in Arum maculatum, A. Hébert and F. Heim (*Assoc. Franç. Avanc. Sci., Compt. Rend., 37* (*1908*), *pp. 352, 353*).—According to the authors, hydrocyanic acid exists in a free state in *A. maculatum* only in the green parts of the plant and is not formed in any portion where chlorophyll is lacking. In the leaves the proportion of hydrocyanic acid increases from the time they appear above ground until the opening of the spathe, after which there is a progressive loss. It is absent in the flower parts in all stages of their development, and the authors claim that there is no warrant for the hypothesis of Büsch that it has a toxic effect on insects visiting the flowers, as there is not a trace to be found. The small amount present in the plant the authors believe, can not be considered as a defense against leaf-eating animals.

The oil of bitter almonds in Centaurea aspera, C. Gerber and J. Cotte (*Assoc. Franç. Avanc. Sci., Compt. Rend., 37* (*1908*), *pp. 522, 523*).—The authors report the presence of oil of bitter almond, benzaldehyde, in the distillate obtained from macerated green leaves of *C. aspera*, and accompanying it was found hydrocyanic acid. These bodies, the authors claim, do not occur free in the plant but in a glucosid of the amygdalin group. The function of hydrocyanic acid is held to be not protective but a stage in the albuminoid synthesis of the plant.

Photochemical synthesis of carbohydrates in the absence of chlorophyll, J. Stoklasa and W. Zdobnický (*Chem. Ztg., 34* (*1910*), *No. 107, pp. 945, 946*).—The authors have investigated the possibility of the synthesis of carbohydrates in the absence of chlorophyll by exposing carbon dioxid and nascent hydrogen to the influence of ultraviolet rays. Photosynthesis was effected, the reaction being according to the following formula: $2CO_2+2H_2=2HCOH+O_2$. The formaldehyde in this was condensed by potassium hydroxid into sugar. Formaldehyde was not formed in the absence of the ultraviolet rays, and while it was produced in small quantities from carbon dioxid and vapor, it was impossible to condense it into sugar.

The action of ultraviolet rays in the presence or absence of chlorophyll in the higher plants, as well as on the formation of carbohydrates, is a subject under investigation. It has already been found that photosynthesis in etiolated plants is greatly stimulated by the action of these rays.

The utilization of xylan by Xylaria hypoxylon, M. Molliard and C. L. Gatin (*Bul. Soc. Bot. France, 57* (*1910*), *No. 2, pp. 127–131*).—As a result of investigations on the utilization of xylan by this fungus, it was found that xylan is one of the constituents of the lignified membrane of plants which is capable of being hydrolyzed by the fungus and that it furnishes the necessary carbohydrate for the development of the fungus. Judging from the morphological characters presented in the cultures, the absence of woody tissues, which contain xylan, resulted in an incomplete development of the saphrophyte.

Water requirements of crops in India, J. W. LEATHER (*Mem. Dept. Agr. India, Chem. Ser., 1 (1910), pp. 133–184; abs. in Chem. Zentbl., 1910, I, No. 26, p. 2133*).—In extensive pot experiments with the more important cultivated plants of India the author determined the quantity of water evaporated by plants in the production of a unit weight of dry substance, and studied in this connection the influence of the size of the pot, the moisture content of the soil, the fertilizer, the period of growth, the kind of plant, the temperature, and the humidity.

The type localities of plants first described from New Mexico; a bibliography of New Mexican botany, P. C. STANDLEY (*U. S. Nat. Mus., Contrib. Nat. Herbarium, 13, pt. 6, pp. XIV+143–246, pl. 1, map 1*).—This paper is designed to assist students of the taxonomy and distribution, and to some extent of the ecology, of the New Mexican flora, and contains an annotated list of those plants that have their type localities in New Mexico, together with a bibliography of the literature of New Mexican botany.

The North American species of Panicum, A. S. HITCHCOCK and AGNES CHASE (*U. S. Nat. Mus., Contrib. Nat. Herbarium, 15, pp. XIV+396, figs. 370*).—This paper discusses the species of Panicum known to occur in North America north of Panama, including the West Indies, the results being based largely on studies of the collections in the United States National Herbarium, supplemented by examinations of the material in all the large herbaria in this country and in Europe.

FIELD CROPS.

Field experiments with farm crops, W. SAUNDERS, J. H. GRISDALE, W. T. MACOUN, C. E. SAUNDERS, F. T. SHUTT, H. T. GÜSSOW, R. ROBERTSON, J. MURRAY, A. MACKAY, W. H. FAIRFIELD, G. H. HUTTON, and T. A. SHARPE (*Canada Expt. Farms Rpts. 1910, pp. 12, 13, 27–43, 46–49, 105–122, 143–150, 160–167, 170–187, 193–196, 204–208, 279–283, 307–326, 341–367, 381–403, 414–419, 426–443, 446–458, 471–486, 494–504, pl. 1*).—Continuing work with field crops previously noted (E. S. R., 22, p. 330), in 1909 the various farms conducted tests of numerous varieties of corn, oats, two and six rowed barleys, spring, winter, and durum wheat, emmer, spelt, buckwheat, flax, spring and winter rye, millet, peas, field peas, alfalfa, red clover, alsike clover, timothy, mangels, turnips, carrots, sugar beets, and potatoes. Tables state the yields obtained in these tests and the more important cultural and varietal data collected in many of them.

The results of tests of 1,385 samples of seeds for the purpose of ascertaining the climatic conditions most favorable to high vitality and the influence of seasonal variations are reported in tabular form, the data for wheat, barley, and oats being grouped by provinces.

The final results in a 22 years' fertilizer test conducted at the Central Experimental Farm at Ottawa are reported for 3 periods (1) 1888–1898 and 1899, (2) 1900–1904, and (3) 1905–1910. Clover was grown during the second period but during the third the use of fertilizers was resumed as conducted in the first. The plats treated with manure gave the highest yields in all periods and for all crops except that during the clover period several of the plats of corn which had been treated with commercial fertilizers produced higher yields than the manured plats. Rotted manure produced higher average yields than fresh manure on all crops save barley, oats, mangels, and turnips. On the root crops the difference was variable in direction and slight in amount.

In the rotation experiments the highest net profits, $8.55 per acre, were secured with (1) a clover hay, timothy hay, grain, corn, and grain, and (2) a clover hay, grain, clover hay, corn, grain rotation. The corn, grain, clover hay rotation which gave the highest profit in 1908 came next with $8.39 during 1909. Tables state in full the items of expense in raising the crops of each of the 8 rotations in 1909 as well as the yields and values.

The yields of 4 varieties of potatoes during 16 years seemed to indicate that careful selection and cultivation had increased their productivity by 47¼ bu. per acre, but unfavorable seasons which weakened vitality apparently caused a falling off of 227 bu. per acre in yield. Imported seed of 6 varieties yielded almost twice as heavily as the home-grown seed of the same sorts, which was thought to be weakened. The horticulturist regards it as proved that tubers have more vitality if not hurried to maturity by hot, dry weather and thinks that this may explain the advantage often derived from seed imported from the moister, cooler regions.

The cerealist gives a progress report of wheat breeding, and reviews the earlier results at the Central Farm. Among the spring wheats tested "Bishop is a very early beardless wheat which has given exceptionally high yields." It is pale but not a soft wheat.

Uninoculated, seed inoculated, and soil inoculated alfalfa yielded 127.6, 118.6, and 126.8 gm., respectively, in pot experiments and 7 lbs. 3 oz., 4 lbs. 15 oz., and 7 lbs. 5 oz., respectively, of air dried material in plat experiments. In similar experiments with peas the uninoculated crop was uniformly the greatest.

A table states the composition of wheat straw and heads at different stages of growth from flowering to the time when the grain was dead ripe. The dry matter increased continuously. "The total nitrogen in the fresh straw remains practically constant until the kernel has reached the dough stage, it then declines somewhat rapidly until the grain is ready for harvesting. . . . Considering the total nitrogen content of the water-free substance a steady decrease is to be noticed until the grain is ready for harvesting, after which it remains practically constant . . . Until the late dough stage the proportion of albuminoid and non-albuminoid nitrogen remains fairly constant;" then there is a sudden but slight increase in the albuminoid nitrogen.

The oil and protein contents of flax seed varied from 34.5 to 42.2 and from 19.6 to 27.56 per cent the averages being 37.1 and 24.77, respectively. While no constant ratio between oil and protein content appear "in a general way, how- and plump seeded samples stood very high in oil content. Ergot was found in the inflorescences of *Carex stellulata*.

At the Nappan Farm, corn planted in rows 35 in. apart gave the highest yield. The 8 acres of heavy run-out clay showed increased yields of 362, 542, and 1,162 lbs. per acre respectively of timothy and clover hay after applications of (1) 300 lbs. of fertilizer, (2) 600 lbs. of fertilizer, and (3) 10 cartloads of manure per acre. The results of 12 tests of different fertilizer and manurial applications to turnip fields ranged from losses of $7.07 to gains of 59 cts. per acre. Wheat, barley, and oats produced higher yields of at least 1 bu. per acre after clover than on land not in clover the preceding year.

At the Brandon Farm, all mixtures of Daubeney oats and Mensury barley gave higher grain yields than either alone, but only one mixture excelled the yield of Banner oats planted alone. The Daubeney variety was used because it ordinarily ripens with the barley. A mixture of Arthur peas and Banner oats produced yields higher than those of the peas alone, but lower than those of the oats alone. Summaries are given of the 1905–1909 results of rotation experiments at the Brandon and Indian Head farms, the plan of which has been previously noted (E. S. R., 22, p. 332). Tables state the yields and value of each crop on each plat during each of the years of the experiment and the total revenue per acre for the entire period in each case. Three varieties of corn have been tested for planting at different distances. "The highest average yield for 11 years is from sowing in rows 24 in. apart, but there is very little difference between this and 30 in. apart. . . . Should cleaning the land be an object in view, it must be sown at least 36 in. apart."

At the Indian Head Farm, 9 strains of alfalfa, secured from this Department in 1905, were tested. In 1909, Minnesota (Grimm) yielded 4 tons 870 lbs. per acre; New York, Samarkand, and Nebraska were also grown, but their second crops were used for silage so the complete yields are not reported. Of 27 strains received from the Department in 1909, "all germinated evenly and made a thick, even stand with the exception of *Medicago ruthenica* and *M. falcata*, which attained a height of only a few inches at the end of the growing season."

At the Lethbridge dry farm, wheat drilled immediately behind the binder in order to catch the fall rains yielded 10 bu. and 20 lbs. per acre. The fields broken from native prairie in June, 1908, and sown in September averaged about 21 bu. and 50 lbs. per acre. Wheat sown September first produced a higher yield than any of the earlier or later sowings. Red Fife on back set land yielded 4 bu. and 51 lbs. more than on land not back set, while in the second year of a similar test the advantage was 1 bu. and 56 lbs. Inoculated and uninoculated plats of alfalfa averaged 5,810 and 3,988 lbs. of hay for the season, respectively.

On the irrigated farm at Lethbridge, tests of the possibility of growing Red Fife wheat more nearly free from yellow berry were instituted. Seed free from yellow berry produced 32 per cent of yellow-berry kernels as compared with 56 per cent from that not free. The yields per acre of Prussian Blue pea vines were 2,325, 4,030, 4,725, and 4,290 lbs., respectively, on the check plat and on plats inoculated with a pure culture, with Brandon soil, and with Ontario soil. Inoculated alfalfa, sown in May, 1908, had little advantage over the uninoculated in color and appearance, but yielded 2 tons more per acre in 1909.

At the Lacombe Farm, August 8 proved the best date of seeding for winter wheat, May 10 for spring wheat, May 31 for oats, and May 24 to 31 the best dates for sowing barley. Applications of nitrate of soda, basic slag, muriate of potash, and superphosphate of lime were followed by from 2 to 3 times as high a yield of spring wheat as were secured on the check plat. Applications of 10 and 20 tons of barnyard manure to land similarly treated in 1908 were followed by yields of 49 bu. and 14 lbs. and 67 bu. and 2 lbs. of oats, respectivel.y Similar results were obtained in barley tests. Both spring and fall-plowed barley yielded more heavily when packed than when the soil packer was not used. Yields of dried alfalfa of 4,080, 5,100, and 3,360 lbs. per acre, respectively, were secured from uninoculated, soil inoculated, and culture inoculated plantings. An application of 561 lbs. of superphosphate and 111 lbs. of sulphate of potash was followed by an increase of 58 bu. and 18 lbs. of potatoes per acre. Country Gentleman potatoes planted 4 in. deep produced more heavily than seed planted either 2 or 6 in. deep. The deeper the planting the fewer were the unmarketable potatoes secured within the limits of the experiment.

Tests of rates of sowing were made at several of the farms. Small grains were usually sown at rates of 15, 30, 45, etc., up to 120 lbs. per acre. In other cases, seedings were at the rate of 1, $1\frac{1}{2}$, etc., up to $4\frac{1}{2}$ bu. per acre. Alfalfa was seeded at the rate of 5, 10, 15, and 20 lbs. per acre. The rates that appeared most productive are indicated in the following table.

Results in tests of rates of sowing some field crops.

Crop.	Experimental farm.	Rate.	Yield per acre.	
		Lbs.	*Bu.*	*Lbs.*
Winter wheat	Lethbridge (nonirrigated).	75	54	20
Barley (Mensury)	....do	105	35	40
Spring wheat	Lethbridge (irrigated).	105	38	40
Oats (Banner)	....do	105	94	4
Barley (Mensury)	....do	75	51	12
			Tons.	
Alfalfa	....do	15	6.67	
		Bu.	*Bu.*	*Lbs.*
Winter wheat	Lacombe	2.00	12	33.75
Spring wheat	....do	2.25	36	50.50
Oats (Banner)	....do	2.00	56	16.00
Oats (Thousand Dollar).	....do	2.50	39	9.00
Barley (Mensury)	....do	1.00	29	18.00
Barley (Invincible).	....do	3.00	40	30.00

Results obtained in 1910 on the Dominion experimental farms from trial plats of grain, fodder corn, field roots, and potatoes, C. E. SAUNDERS (*Canada Cent. Expt. Farm Bul. 66, pp. 64*).—This bulletin states the yields obtained in variety tests at the recently established stations at Charlottetown, Prince Edward Island, and Rosthern, Saskatchewan, as well as at the older experimental farms in 1910. The following table shows the highest 5-year averages at the different farms:

Variety tests at the Dominion experimental farms.

Crop.	Variety.	Five-year average yield.		Days to maturity.
Ottawa.				
		Bu.	*Lbs.*	
Spring wheat	Chelsea	35	22	97
Oats	Thousand Dollar.	71	16	91
Barley	Manchurian	59	8	88
Do	Hannchen	54	6	90
Peas	Prussian Blue.	40	......	98
		Tons.		
Indian corn	Eureka	21	1,868	......
Turnips	Good Luck	31	1,770	......
Mangels	Selected Yellow Globe.	36	1,720	......
Carrots	Improved Short White.	26	1,520	......
Sugar beets	French Very Rich.	22	460	......
		Bu.		
Potatoes	Dalmeny Beauty.	276	19	......
Nappan.				
Spring wheat	White Fife	36	12	112
Oats	Golden Beauty	65	26	103
Barley	Stella	46	28	98
Do	French Chevalier.	51	19	99
		Tons.		
Sugar beets	Klein Wanzleben.	18	274	......
		Bu.		
Potatoes	American Wonder.	429	20	......
Indian Head.				
Spring wheat	Huron	40	28	127
Oats	Banner	101	14	113
Barley	Stella	58	......	100
Do	Danish Chevalier.	58	4	105
Peas	Mackay	46	20	116
Indian Head—Continued.				
		Tons.		
Indian corn	Eureka	16	1,088	......
Turnips	Hartley Bronze.	25	1,691	......
Mangels	Giant Yellow Globe.	23	1,969	......
Carrots	Ontario Champion.	15	1,310	......
Sugar beets	Klein Wanzleben.	12	1,106	......
Nappan.				
		Bu.		
Peas	Picton	27	56	105
		Tons.	*Lbs.*	
Indian corn	Angel of Midnight.	19	280	......
Turnips	Hall Westbury	30	254	......
Mangels	Yellow Intermediate.	29	1,268	......
Carrots	Ontario Champion.	17	1,059	......
Sugar beets	Vilmorin Improved.	13	730	......
		Bu.		
Potatoes	Vick Extra Early.	454	58	......
Brandon.				
Spring wheat	Preston	42	58	111
Oats	Banner	111	16	100
Barley	Odessa	61	30	85
Do	Swedish Chevalier.	59	10	90
Peas	Mackay	48	9	121
		Tons.		
Indian corn	Longfellow	19	1,006	......
Turnips	Hall Westbury	25	1,374	......

Variety tests at the Dominion experimental farms—Continued.

Crop.	Variety.	Five-year average yield.		Days to maturity.	Crop.	Variety.	Five-year average yield.		Days to maturity.
Brandon—Con.		*Tons.*	*Lbs.*		*Agassiz*—Con.		*Bu.*	*Lbs.*	
Mangels	Gate Post	27	1,598	......	Peas	Golden Vine	44	10	117
Carrots	Improved Short White.	16	32	......			*Tons.*		
Indian Head.					Indian corn	Superior Fodder.	18	102	......
		Bu.							
Potatoes	Everett	448	21	......	Turnips	Jumbo	28	1,701	......
Agassiz.					Mangels	Yellow Intermediate.	23	927	......
Oats	Improved American.	76	31	116	Carrots	Improved Short White.	32	139	......
Barley	Mensury	47	22	104	Sugar beets	Vilmorin Improved.	14	589	......
Do	Danish Chevalier.	51	20	110			*Bu.*		
					Potatoes	Late Puritan	402	42	......

Main conclusions from the Poltava Experiment Field, S. TRETYAKOV (*Khutoryanin, 1909, No. 42; abs. in Zhur. Opytn. Agron (Russ. Jour. Expt. Landw.), 11 (1910), No. 2, pp. 285–287*).—Local acclimated varieties of cereals gave larger yields than varieties of western origin. The climatic conditions of the Poltava government are not favorable for the cultivation of barley for brewing.

The yields of corn varied from 170 to 250 poods of grain per dessyatina (from 2,271.2 to 3,340 lbs. per acre). The increase of the depth of plowing from $5\frac{1}{4}$ to $10\frac{1}{2}$ inches raised the average yield by 27 poods, and an increase from $7\frac{7}{8}$ to $10\frac{1}{2}$ inches by 17.4 poods. Manure increased the yield by 11.8 per cent in the case of shallow plowing, and by 8.3 per cent in plowing 12 in. deep.

The largest crops of potatoes were obtained from the varieties Emperor Richter and Poltovka, containing 20.5 and 19.9 per cent of starch, respectively. An increase of depth of plowing from $5\frac{1}{4}$ to $7\frac{7}{8}$ in. raised the yield of tubers by 40 poods, from $5\frac{1}{4}$ to $10\frac{1}{2}$ in. by 153 poods, and from $7\frac{7}{8}$ to $10\frac{1}{2}$ in. by 113 poods per dessyatina.

The best yields of fodder beets were obtained from Red Oberndorf. Manure applied under the crop preceding the beets gave an increase of 24.5 per cent. Plowing deep, $10\frac{1}{2}$ to 12 in., increased the yield on unfertilized plats by 11.8 per cent and on fertilized plats by 23.7 per cent.

Clover gave yields up to 457 poods and on fertilizing up to 563 poods per dessyatina, but is not hardy enough to stand the severe winters and frequently perishes. Common alfalfa thrives very well, yielding up to 211 poods of hay. Deep plowing and manure increase the yield considerably.

Breeding drought-resistant forage plants for the Great Plains area, A. C. DILLMAN (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 196, pp. 40, pls. 4*).—This paper gives a progress report of the breeding of alfalfa, sorghum, millet, smooth brome grass, and other forage plants for semiarid conditions, at Bellefourche, S. Dak., and Akron, Colo., in continuation of work already noted (E. S. R., 19, p. 131).

The author states the climatic and other conditions at the experiment farms and discusses the work with the 6 alfalfa strains, A–F, which were formerly known as South Dakota Nos. 65, 66, 67, 150, 162, and 164. Tables show the proportion of typical plants in each strain as well as the average dry weight and seed yield per plant, the seed yield per 100 gm. of dry matter, the total number of plants harvested, and the winterkilling in 1908–9. The winterkilling ranged from 1 to 4 per cent for the 3 strains for which it is reported. Strain E excelled the others in seed yield and forage production, indicating "that large seed yield and heavy forage production can be combined in the same strain." Broadcast plats and double cultivated rows of Grimm yielded at the rates of 120 and 85 lbs. of seed per acre respectively as compared with estimated perfect stand yields of 348 and 430 lbs. per acre from (1) strains D and F, and (2) strain E in hills.

At Highmore, S. Dak., the sorghum South Dakota 341 yielded 10,975, 5,350, and 7,700 lbs. per acre, respectively, during 1906, 1907, and 1908. At Bellefourche, in 1908 and 1909, its average yields were 3,265 and 5,920 lbs. per acre. Brief reports are given of 5 of the 18 selections made from this variety to develop drought resistance, early maturity, and forage quality.

Among the foxtail millets (*Chætochloa italica*) grown, Common, Siberian, and Kursk yielded at the rates of 2,530, 2,470, and 2,210 lbs. per acre, respectively. Common had the shortest maturing period and highest proportion of seed to straw, but was excelled by Kursk both in total weight of plant and weight of seed. Kursk was also the most uniform, perhaps because the bulk seed from which it was grown was a product of two selections made 3 or 4 generations back. The remarkable trueness to seed is recorded as "indicating that millet is probably a self-pollinated plant." "The average seed yield of the Kursk progeny rows was . . . equivalent to a yield of 25 bu. per acre." Tables state the dry weight of plants, weight of seed, proportion of seed to 100 parts of straw, maturing period, stand in row, and total weight calculated to a full stand.

Of stocks of brome grass seed tested, "South Dakota No. 26 appeared decidedly superior to the others in forage production," and its cultural characters are described. *Agropyron cristatum*, recently introduced from Siberia, appeared very hardy. It started early and was not injured by severe frosts. It is a bunch grass without creeping rootstocks, and resembles western wheat grass (*A. smithii*) in harshness and foliage. Unsatisfactory yields of numerous varieties of Canada peas, grass peas (*Lathyrus sativus*), and vetches were obtained at Bellefourche, but breeding work has been taken up with 2 or 3 promising varieties of Canada peas. Western wheat grass proved remarkably drought resistant but scattered and thin in growth.

Chemical analyses of the grasses tested are summarized from sources previously noted (E. S. R., 6, p. 403; 20, p. 135).

Alfalfa investigations, P. B. Kennedy (*Nevada Sta. Bul. 72, pp. 20–23*).—Brief notes on the characteristics of 13 varieties of alfalfa under test are reported.

The relation of albumin content, 1,000-kernel weight, amount of protein per kernel, and amount of extract to the malting qualities of barley, A. Wlokka (*Wchnschr. Brau., 27 (1910), No. 37, pp. 457–463*).—In view of data presented the author concludes that as long as the kernel weight remains reasonably constant the percentage of albumin present determines the malting value of the barley. As the 1,000-kernel weight increases so does the malting value, provided the method of handling introduces no abnormal decrease of dry substance. Variations of hull percentage and 1,000-kernel weight introduce variations of albumin content, but this is too difficult to discern to be of practical importance in buying. Tables show the 1,000-kernel weight and albumin in the dry substance and the weight of protein per kernel of the samples examined, and present groupings of the data secured which show statistically the relation between albumin content and 1,000-kernel weight.

Stand and soil fertility as factors in the testing of varieties of corn, C. A. Mooers (*Tennessee Sta. Bul. 89, pp. 37–53, dgms. 4*).—The author reports the yields and other data obtained in variety tests of corn and experiments in different rates of planting on various soils.

The number of ears per stalk reported varied from 1.8 for Albemarle Prolific to 0.97 for Shaw Improved under similar conditions. Plantings at the rates of 6,000, 8,000, and 10,000 stalks per acre usually gave the highest yields of grain and stover in case of the highest rate of planting. The Huffman variety showed a special capacity for high yield when thickly planted.

The author concludes that, under like conditions of soil and culture, varieties differ as to optimum number of stalks per acre. The taller the variety the less will be the optimum number of stalks per acre, although this rule has marked exceptions.

Breeding new types of Egyptian cotton, T. H. KEARNEY (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 200, pp. 39, pls. 4*).—Imported Mit Afifi seed used in beginning cotton breeding work in 1902 was the source from which the Yuma and Somerton varieties were obtained. Strains Nos. 360, 361, and 362 constitute a third type of similar origin. The work was done at Carlsbad, N. Mex., and Yuma and Sacaton, Ariz., in continuation of that previously noted (E. S. R., 20, p. 136). The author gives the history of the origin and development of each type and states its performance and the principal characteristics of its ancestry.

Sufficient uniformity for market purposes can be attained by selection and by "roguing out" markedly aberrant individuals. The diversity caused by crossing with other types of cotton was eliminated by careful selection of types. The Yuma and Somerton varieties, however, are recorded as mutants. They resemble other Egyptian varieties believed to be derived from Mit Afifi in size and shape of boll and color of fiber. Yuma is satisfactory in uniformity of productiveness, habit, and fiber quality. It has a strong tendency to develop a stout main stem with long fruiting branches, long taper-pointed bolls, and a strong, silky, cream-colored fiber about 1⅝ in. in length. Somerton is similar in length of bolls and in fiber characters, but the bolls are more sharply pointed, the seeds smoother, the lint percentage smaller, the plants bushier, and the development of the vegetative branches greater. The third type, strains Nos. 360, 361, and 362, differs from the other varieties in the possession of an open habit, large limbs nearly equaling the main stem, short, plump, abruptly pointed bolls, and strong, brown fiber from 1¼ to 1⅜ in. in length. Other less distinct types have been developed but are either less satisfactory or have not yet been sufficiently tested.

Imported seed of Egyptian varieties planted in 1909 differed greatly in manifestation of individual diversity but failed to equal the acclimatized stock in quality or quantity of lint. First generation hybrids surpassed the pure Egyptian plants in fruitfulness, size of bolls, and abundance, length, and strength of fiber, but the second generation plants varied excessively in type and were inferior to the first generation parents in yield and excellence of fiber. A test of the feasibility of the commercial production of first generation hybrid seed indicated that the early flowering habit of most upland varieties would necessitate planting them earlier than the Egyptian variety, unless a late-flowering upland variety could be selected for interplanting with Egyptian varieties.

Planting on successive dates gave no conclusive results but indicated the advantage of planting Egyptian cotton in the Colorado River region as early as weather permits. Seed from the different pickings of the season gave no distinctively different results. The transfer of the acclimatized seed did not induce as great a diversity as that observed in newly imported seed or mixed seed of different acclimatized stocks planted in new places. The difficulties of local adjustment "are not likely to interfere seriously with the extensive utilization of selected types possessing a high degree of prepotency."

The author presents tables showing the average price per pound of good fair Egyptian and middling Upland cottons on the Boston market during the first 10 months of 1909, and of middling Upland and 4 grades of Egyptian cotton during the succeeding 9 months. Frequent references are given to other publications of this Department.

Correlation between the longitudinal diameter of potato tubers and their starchiness, M. D. Renski (*Khozîaistvo, 1909, No. 40; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 2, p. 228*).—Results of many years' observations at the Poltava Experiment Field show an average starch content of many varieties with long tubers of 18.5 per cent, while that of the varieties with spheroidal tubers during the same long periods was 23.5 per cent.

The soy bean; history, varieties, and field studies, C. V. Piper and W. J. Morse (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 197, pp. 84, pls. 8*).—The authors give a botanical history of the soy bean and state the classifications of Martens and Harz on the basis of seed color and shape of pod respectively. They regard these classifications as of little value. The varietal characteristics of soy beans are stated, the varieties introduced into the United States before 1898, or independently of this Department, enumerated, European and Asiatic varieties briefly dealt with from the historical standpoint, synopses of the groups and varieties given, and a full catalogue of soy-bean varieties presented. Full references to the literature of the subject are given.

Experimental work reported indicates that on one occasion a minimum temperature of 27° F. killed the majority of the late varieties, but that the Riceland and Barchet varieties retained about 50 per cent of the leaves and all of the pods. No. 20798E, derived from Barchet, retained 70 per cent of its green leaves and had no pods injured. In a variety trial at Muskegon, Mich., the Guelph, Ito San, and Ogemaw varieties proved quite frost resistant. The work of Haberlandt at Vienna indicated that successive plantings at intervals of a week, from March 31 to June 9, resulted in crops with decreasing life periods and total heat requirement up to time of germination, blossoming, and maturity.

Similar data obtained at the Tennessee Station (E. S. R., 20, p. 1031) and at the Arlington Experimental Farm are presented in tabular form. Twenty-eight varieties were tested at the latter point during 1905–1909, of which the Ogemaw variety matured in 88, 102, 105, and 112 days respectively in 1905, 1907, 1908, and 1909. No variants have ever occurred in this variety. These conclusions agree with some drawn from work already noted (E. S. R., 18, p. 1122). Limited data indicate that Butterball also became later at Arlington or earlier at the Minnesota Station, but that no change occurred in Buckshot or Manhattan. A table presents full data on this point and indicates the source of seed in each case.

The bagging of 30 plants, representing 10 varieties, indicates that the soy-bean flower is completely self-fertile. Cross pollination would be frequent but for the abundant self-pollination soon after opening. The percentage of hybrids found is very small but the color of heterozygote seed is often unstable. Tables present the variations in hybrid soy-bean plants and their progeny at Arlington with reference to life period, color of seed, and pubescence. Trenton is cited as a brown-seeded variant from yellow-seeded Mammoth, but otherwise undistinguishable from it. Riceland proved exceedingly variable in 1908 at Biloxi, Miss. "The seed was saved from individual plants showing the most striking variations and the resultant plants of each in 1909 were uniform."

Influence of manure on the yield of winter wheat and the beets following, S. L. FRANKFURT (*Khoziaistvo, 1909, Nos. 18–20; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 2, pp. 236–239*).—The experiments were begun in 1902 and the present article reports the results obtained in 1906–1908.

Manure to the amount of 13,360 lbs. per acre gave a marked increase of the yield of winter wheat, but larger quantities of manure were no more effective. Of the mineral fertilizers only superphosphate was helpful. Simultaneous applications of manure and mineral fertilizers gave higher yields than those of either manure or mineral fertilizers separately. Manure introduced under the preceding winter cereals increased both the yield of the beets following and the percentage of sugar in them. Mineral fertilizers acted similarly but did not increase the percentage of sugar as much as manure. Mineral fertilizers directly applied under beets increased both the yield and the sugar percentage of the beets more than the application of manure to the preceding winter wheat.

Mineral fertilizers under summer wheat at the Poltava Experiment Field, S. TRETYAKOV (*Ratsion. Udobr., 1909, No. 6; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 2, p. 242*).—It is pointed out that Kulomzin phosphorite does not exercise any influence on the forest loam of the Poltava Experiment Field when applied under winter wheat and the following summer wheat. Manure under the same conditions increases the yield.

Results of seed tests for 1910, F. W. TAYLOR (*New Hampshire Sta. Bul. 148, pp. 187–209, figs. 2*).—The text of the New Hampshire law of 1909 regulating the sale of agricultural seeds is followed by a discussion of its object, a statement of the germination standards for seeds of different crops, and directions for submitting samples for test.

Tables give the results of purity and germination tests of 238 samples of seeds examined during the first 6 months of 1910. Among these, the average germination of field corn found was 10 per cent below the standard. Peas and beans were also below the standard but the average for sweet corn was practically up to standard.

HORTICULTURE.

A practical treatise of how to grow flowers, fruits, vegetables, shrubbery, evergreens, shade trees, ornamental trees.—Plant pests, diseases and remedies, C. H. TRITSCHLER and W. D. BUCHANAN (*Nashville, Tenn., 1910, pp. 167, pls. 2*).—The purpose of this work is to present to the amateur a concise knowledge of each subject embraced.

Up-to-date truck growing in the South, J. R. DAVIS (*Atlanta, Ga., 1910, pp. 188, pl. 1, figs. 40*).—A practical treatise representing largely the experience of the author but including special chapters by experts on the culture of a number of crops.

[Horticultural work at the Canadian experiment stations], W. T. MACOUN, R. ROBERTSON, J. MURRAY, A. MACKAY, W. H. FAIRFIELD, G. H. HUTTON, and T. A. SHARPE (*Canada Expt. Farms Rpts. 1910, pp. 128–143, 155–157, 327–329, 372–379, 403–413, 443–446, 458–468, 486, 487, 504–511, pls. 7*).—This is the customary report on the condition and character of fruits, vegetables, flowers, and ornamental shrubs tested during the year at the different experimental farms in Canada. The data are quite similar to those found in previous reports (E. S. R., 22, p. 338).

A large number of seedling apples, 3 seedling plums, and a seedling gooseberry received at the Central Farm for examination are described. Eighty-nine additional varieties of the seedling apples which were originated on the farm fruited during the year,. 14 of which are here described as being of considerable promise. The closely planted Wealthy apple orchard (E. S. R., 21, p. 331) has given an average net profit per acre from the date of planting, 1896 to 1909, of $68.14 and an average net profit per acre from the date of fruiting, 1899 to 1909, of $100.36. Other early bearing varieties are being tested to see how they will succeed when planted closely. The Omaha and Yuteca, 2 new plums of considerable promise, fruited during the year and are discussed. Lists are given of the best varieties of sweet corn, garden peas, and tomatoes tested at the farm. As a result of 9 years' selection for earliness and 6 years' selection for large early production, an improved strain of the Sparks Earliana has been originated at the farm. A descriptive list is given of the best varieties of Philadelphus tested in the arboretum.

At the Indian Head Farm, Saskatchewan, 17 varieties of seedling plums obtained from the South Dakota Experiment Station in 1908 came through the winter safely.

A review of the fruits and plants introduced in Georgia during the past fifty years, P. J. Berckmans (*Ga. Bd. Ent. Bul. 33, 1910, pp. 48–55*).—A brief review of some of the more important fruits and plants either originated or introduced by the author.

[Varieties of fruits and ornamentals for Nebraska], G. A. Marshall et al. (*Ann. Rpt. Nebr. Hort. Soc., 41 (1909–10), pp. 23–35*).—A revised list prepared under the direction of the Nebraska State Horticultural Society is given of orchard and small fruits which are recommended for planting in the 19 districts into which the State is divided. A list including trees, shrubs, roses, vines, bulbs, etc., which applies to the entire State, except where otherwise specified, is also given.

The Royal Botanic Garden and Royal Botanic Museum at Dahlem, A. Engler et al. (*Der Königliche Botanische Garten und das Königliche Botanische Museum zu Dahlem. Berlin, 1909, pp. 158, figs. 78, map. 1*).—This work, which is issued by the Prussian ministry of ecclesiastical, educational, and medical affairs, consists of a descriptive account of the purposes, equipment, and various collections of the Royal Botanic Garden and the Royal Botanic Museum at Dahlem.

The cultivation of deciduous fruits in Naples, L. Savastano (*Bol. Arbor. Ital., 6 (1910), No. 2–4, pp. 113–216*).—This is a critical and synthetical examination of the fruit industries of Naples. Part 1 discusses general conditions relative to the culture, marketing, and commerce in export fruits; part 2 contains a detailed study of the peach, apricot, cherry, prune, and almond industries; part 3 treats in a similar manner of the apple, pear, and other pome fruits. General conclusions of a cultural, commercial, and industrial nature are given, together with special conclusions relative to the culture of different fruits.

A bibliography of works consulted is appended.

Summer apples in the Middle Atlantic States, H. P. Gould (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 194, pp. 96, pls. 4, figs. 7*).—This bulletin reports the second of a series of systematic fruit district investigations which are now in progress by the Bureau of Plant Industry (E. S. R., 20, p. 641). It describes the Coastal Plain region of the Middle Atlantic States relative to its geographic position, topography, elevation, soil, climate and other conditions, discusses the advantages and possibilities in relation to the production of early apples, the general character of cultural and fruit handling methods now prevailing, and also takes up the principal varieties of apples now grown there with a view of indicating their relative value in the further development of the early apple industry in that section. Summarized data are also presented showing the use, relative importance, and season of edible maturity suitable to growing in the Middle Atlantic States.

Phenological records compiled from data secured from a large number of cooperative observers are given for several of the important varieties. The data for each variety show the State, approximate latitude, elevation, slope, soil, and year in which the observation was made, age of tree, and the following dates: First bloom, full bloom, last spring frost, opening of leaf buds, forming of terminal buds, first picking, first fall frost, when fit for use, and keeping period.

Although much of the information is only directly applicable to the region studied, it is believed that the discussion will prove of value to growers of summer apples generally.

[Orchard investigations in Nevada], P. B. Kennedy (*Nevada Sta. Bul. 72, pp. 19, 20, pl. 1*).—The blooming dates for 1909 are given of the various varieties of apples growing in the station orchard. As with all other low-lying orchards in the State the blossoms were destroyed by killing frosts on May 11. Only a single variety, Rome Beauty, produced a few apples from blossoms coming out after the above date.

The influence of the leaves which immediately accompany the fruits of pears on the increase in weight and chemical composition of the fruit, G. Rivière and G. Bailhache (*Jour. Soc. Nat. Hort. France, 4. ser., 11 (1910), Nov., pp. 678–680*).—A study similar to that previously reported for the Chasselas Doré grape (E. S. R., 21, p. 140) was made with pears of the variety Directeur Hardy to determine what influence the leaves accompanying the fruit on the spur have on the weight and chemical composition of the fruit. Twenty-four fruit spurs were selected for the experiment, one fruit being left on each spur. Twelve of the spurs were defoliated in the spring and on the other 12 the leaves were allowed to grow but no further fruit buds were allowed to develop.

The data secured show that the average weight of pears from the defoliated spur was 105.4 gm. as compared with an average weight of 130 gm. where the leaves were allowed to grow. The sugar content and density of the fruit from the defoliated spurs was slightly decreased and the acid content slightly higher.

Fig culture in the vicinity of Mistretta, F. Portale (*Bol. Arbor. Ital., 6 (1910), No. 2–4, pp. 49–101, figs. 5*).—A monographic study of the fig relative to its biology, culture, harvesting, preparation for market, and commerce, with special reference to the improvement and extension of the industry in the region of Mistretta. A bibliography of the works consulted is appended.

Drought resistance of the olive in the Southwestern States, S. C. Mason (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 192, pp. 60, pls. 6, figs. 20*).—The author gives an account of a number of plantations of olives which had been previously made along with plantings of apricots, figs, grapes, and some other fruits in the more arid parts of Arizona and California and where through failure of the irrigation systems the trees were thrown on their own resources. The behavior of these abandoned plantations is studied in connection with examples of successful dry-land olive culture in California, as well as in the light of the dry-land olive culture in Tunis, as described by T. H. Kearney in a previous bulletin of the Bureau of Plant Industry (E. S. R., 20, p. 42). The adaptation of olive root systems to limited rainfall and of leaf and stem structure to moisture economy is discussed, together with the area of possible dry-land olive culture in the United States as limited by the minimum temperature, heat requirements, and rainfall. A description of the anatomy of olive roots, leaves, and stems, prepared by T. Holm, is appended.

The varieties of olives growing in the nonirrigated plantations described were of European origin and accustomed to abundant moisture. In view of the remarkable drought resistance of these varieties, the author concludes that by the use of the desert variety Chemlali, together with the adaptation to our conditions of the Tunisian methods of planting and culture, large areas of land in the Southwestern States, possessing a suitable soil and climate, but now undeveloped from lack of irrigation water, may be utilized to produce olive oil. Trial plantations are now being made at various points in the arid region to determine whether such dry-land olive culture will prove a commercial success.

The after effect of commercial fertilizers in vineyards, F. Gvozdenović (*Ztschr. Landw. Versuchsw. Österr., 13 (1910), No. 11, pp. 835–841*).—In continuation of previous demonstration experiments conducted in various vineyards in Görz-Gradiska, Austria (E. S. R., 21, p. 738), data are given to show the residual effect of fertilizers the year following application.

The returns from some 43 experimental areas show an average net increase in yield of 1,030 kg. (over 1 ton) of grapes per hectare on the vineyards receiving a complete fertilizer over the unfertilized vineyards, the value of the fertilizers having been deducted. Since sufficient quantities of stable manure are difficult to secure, it is recommended that as a general thing the vineyards be rather heavily manured at least every 5 years and that every second year a moderate quantity of commercial fertilizer be applied.

Experiments in blueberry culture, F. V. Coville (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 193, pp. 100, pls. 18, figs. 31*).—A full account is given of the author's investigations, conducted largely with swamp blueberries (*Vaccinium corymbosum*), and consisting primarily of extensive pot cultures and laboratory studies, relative to their soil requirements and method of nutrition. From the knowledge thus gained, a system of pot culture, herein fully described, has been developed by the use of which seedlings of the swamp blueberry have been grown into robust plants to a maximum height of 27 in. 12 months from germination, at which period 70 per cent of the plants had laid down flowering buds for the next spring's blossoming, whereas J. Dawson, an earlier investigator, found that the swamp blueberry required from 4 to 6 years to produce fruit from seed.[a] The growth development of the swamp blueberry seedlings, a method of pollination in the absence of outside agencies, possibilities of improvement by breeding and selection, and preliminary experiments in propagation and field culture are also considered.

The results of the soil investigations as a whole led to the conclusion that the swamp blueberry does not thrive in soils generally favorable to the development of agricultural crops, such as rich garden, heavily manured, or heavy clay soils, soils made sweet by lime, or even thoroughly decomposed leaf mold such as has a neutral reaction. For vigorous growth the swamp blueberry requires an acid soil, the favored type of which is peat. The author is of the opinion that peat is particularly satisfactory because the acidity of peat, although of a mild type, is continually maintained. Although the roots of the swamp blueberry may be submerged in water during a portion of the year, they require a well-aerated soil in the growing season. Aeration conditions satisfactory for the blueberry are prevalent in sandy soils, drained fibrous peat land, and in masses of live, moist, but not submerged sphagnum. In the latter situation the chief nourishment of the blueberry plant comes from the bog water sucked up by the sphagnum and not from the sphagnum itself. The failure of previous experimenters to domesticate and improve the blueberry are

[a] Cult. and Country Gent., 50 (1885), p. 660.

attributed largely to the failure to recognize soil acidity as a fundamental requirement of these plants.[a]

The author found that the root-system of the swamp blueberry is devoid of root hairs by means of which ordinary agricultural plants absorb their moisture and food. The rootlets of healthy plants of the swamp blueberry are inhabited by an endotrophic mycorrhiza which appears to have a beneficial effect upon the plant. The acid peaty soils in which the swamp blueberry thrives contain large amounts of nonavailable nitrogen, but are deficient in available nitrogen, owing to the inability of the nitrifying bacteria to thrive in such a soil because of its acidity. From the evidence at hand the inference is drawn that the mycorrhizal fungus transforms the nonavailable nitrogen of such soils into nitrogen available for the nourishment of the plant. Furthermore, in accordance with the work of Miss Charlotte Ternetz with mycorrhizal fungi of certain related European plants (E. S. R., 19, p. 425), it is suggested that the mycorrhizal fungus of the swamp blueberry may transform the free nitrogen of the atmosphere into a form of nitrogen suited to the use of the blueberry plant.

The principal features of successful pot culture are the autumn germination of the seeds, the use of suitable acid soils, plunging the pots in sand to control conditions of moisture and aeration, partial shading of plants during the heat of summer, thereby prolonging the active growing season, and exposing dormant plants to outdoor conditions to facilitate normal growth in the spring. When grown in acid soils the swamp blueberry is little subject to fungus diseases or insect pests.

Based upon experiments already made, 2 methods of experimenting with the field culture of the swamp blueberry are suggested.

Dimorphic branches in tropical crop plants: Cotton, coffee, cacao, the Central American rubber tree, and the banana, O. F. Cook (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 198, pp. 64, pls. 7, figs. 9*).—A study of the branching systems of cotton, coffee, cacao, the Central American rubber tree (Castilla), and the banana leads the author to conclude that these have been specialized on independent lines that can hardly be described on the basis of the usual classification of branches into the 2 general classes of axillary and adventitious. "Each normal plant produces 2 kinds of branches with regular differences of form and function."

This bulletin contains general considerations relative to the structural significance of dimorphic branches, their similarity to alternating generations, and different types of dimorphic branches, describes the nature and extent of branch dimorphism in each of the above named crop plants, and points out numerous cultural applications of these specialized habits of growth, including the relations of dimorphic branches to acclimatization and to weevil resistance in cotton plants, to the methods of propagating and pruning of rubber trees and coffee trees, to the habits of growth and the pruning of cacao, and to the propagation of the banana.

The banana plant produces 2 forms of suckers or offshoots corresponding to the dimorphic branches of the woody species. These are the so-called sword suckers which represent true permanent branches of the rhizome and the so-called broad-leaved suckers which arise as relatively small shoots from near the surface of the ground. Although the sword suckers are generally used for propagating purposes, an experiment conducted by H. Pittier in Costa Rica has shown that dormant tuber-like suckers of the broad-leaved type which are formed on uprooted rhizomes constitute a readily portable form of propagating

[a] The possible value of this acid condition was suggested but not followed up in the blueberry work at the Rhode Island Station (E. S. R., 15, p. 42).

stock from which vigorous and productive plants may be grown. The author suggests the possible use of such tubers in the production of bananas under a system of rotation with other tropical crops.

The general conclusion from the study of these tropical crop plants is in substance that the factor of branch dimorphism must be included in the scientific study of their structure and habits, as well as in the breeding and adaptation of varieties. Systems of cultivation and pruning must likewise be planned with reference to the habits of branching.

Banana experiments, St. Augustine estate, P. Carmody and J. McInroy (*Bul. Dept. Agr. Trinidad, 9 (1910), No. 66, pp. 201–215*).—This is a report on experiments in banana cultivation extending over a period of 4 years and including the condition and treatment of the experimental plats, together with the detailed receipts and expenditures. The results as a whole show that a profit of $200 per acre may be expected from intensive cultivation of bananas in Trinidad under present conditions and prices.

The walnut, E. M. Price (*Sacramento, Cal., 1910, pp. 68, pl. 1, figs. 15*).—A concise treatise on walnut culture, based upon 20 years' experience in growing walnuts in the California Sierras.

The Greening pictorial system of landscape gardening, C. E. Greening (*Monroe, Mich., [1910], pp. 165, pl. 1, figs. 246*).—This work consists of over 200 photographic plates with descriptive reading matter attached portraying various examples of landscape design. Descriptive notes are also given on varieties of trees, shrubs, roses, etc., suitable for avenues, parks, and gardens.

FORESTRY.

The silva of California, W. L. Jepson (*Mem. Univ. Cal., 2 (1910), pp. 480, pls. 85, maps 3*).—In this descriptive account the author has aimed to bring together the present knowledge of the taxonomy and geographical distribution of the timber trees of California. The results, based upon field studies and collections made by the author during the last 19 years, dealing with the dendrological characteristics of various species, their habits, architectural form, seed reproduction, stump-sprouting, longevity, and relation to drought periods are included, together with collected facts regarding nanism and spontaneous hybrids, the behavior of trees attacked or mutilated by fire, animals, or man, and some supplementary notes regarding the economic features of the species especially in regard to wood characteristics. A short account of the "walnut-oak hybrids" by E. B. Babcock (E. S. R., 24, p. 243) is also included.

A list is given of the more important general reference works and a short reference list is included under each species. Numerous photographic illustrations and drawings are appended.

Studies on the comparative anatomy and morphology of coniferous roots, with special reference to their systematic classification, W. Noelle (*Bot. Ztg., 1. Abt., 68 (1910), No. 10–12, pp. 169–266, figs. 50*).—The author first presents special studies of the root systems of Araucariaceæ, Abietineæ, Taxodieæ, and Cupressineæ, on the basis of which a key has been prepared for the determination of the various species according to the structure of their root systems. A general discussion is then given of the anatomy and morphology of coniferous roots as a whole, including a discussion of the primary cortex, central cylinder, secondary wood, secondary cortex, mycorrhiza, and heterorhizia. A bibliography is appended.

Moss cover and wood accretion, K. Böhmerle (*Centbl. Gesam. Forstw., 36 (1910), No. 12, pp. 523–526*).—In the litter experiments conducted in pine forests for a number of years at the Mariabrunn Forestry Station (E. S. R., 18, p. 47), it was noticed that a living moss cover appeared to decrease the growth accretion somewhat. Experiments made during the past 3 years and here presented indicate that a living moss cover does retard the growth of young trees considerably during a dry season, although growth may be somewhat stimulated during a wet season. In a dry season the moss appears to take up most of the rain and allows very little to pass through, as was noted in connection with natural regeneration (E. S. R., 20, p. 945). In a wet season it is possible that the moss cover may aid in storing moisture for use during the dry periods. These results are to be further studied. In general it appears advisable to remove the litter from the forests about every third year to prevent a heavy growth of moss.

Determination of quality of locality by fiber length of wood, C. D. MELL (*Forestry Quart., 8 (1910), No. 4, pp. 419–422*).—Some preliminary microscopical studies of wood fiber of *Juglans californica*, collected from trees growing in different soils and situations, indicate that the length of fiber is a function of site quality.

How to cruise timber, J. W. SHAW (*Portland, Oreg., 1910, pp. 64, dgms. 6*).—This is offered as a complete field manual for experienced cruisers, loggers, and foresters, claimants, or for anyone desiring to learn to estimate timber. In addition to the diagrams and explanations of the standard methods of estimating timber, it explains the details of making estimates, including pacing, surveying, making out reports, etc., and also contains a synopsis of the requirements for the general plan of surveying and the establishment of corners in public land surveys of the United States.

A comparison of Maine and Blodgett log rules, I. G. STETSON (*Forestry Quart., 8 (1910), No. 4, pp. 427–432*).—Some tables based on measurements of actually cut trees are given whereby an estimate by either of the rules of a stand of timber may be converted to an estimate of what the timber when cut will scale under the other rule.

Annual progress report upon state forest administration in South Australia for the year 1909–10, W. GILL (*Ann. Rpt. State Forest Admin. So. Aust., 1909–10, pp. 12, pls. 7*).—A statistical report of the year's planting and other forest operations, revenues, and expenditures, together with a comparative statement of the revenue, expenditure, and legislative provision for the past 32 years.

[Report of chief of forestry division], K. A. CARLSON (*Dept. Agr. Orange River Colony, Ann. Rpt., 5 (1908–9), pp. 107–142*).—In addition to a general review of the work and a financial statement for the year ended June 30, 1909, some condensed notes and directions are given for starting and caring for young evergreen plantations, together with suggestions on the correct sowing of wattles and robinia, and a number of lists of species recommended for different conditions of soil and climate, rapid growth, timber, fuel, windbreaks, and hedges.

The development of forestry in Ohio, J. W. O'BYRNE (*Ohio Forester, 2 (1910), No. 3, pp. 3–16*).—A paper on this subject, discussed under the general headings of early conditions in Ohio, early development and present possibilities, the work of individuals and organizations, and present conditions and plans for the future of Ohio forestry. A list of the more important literature pertaining to Ohio forestry is appended.

Reforesting, C. R. PETTIS (*N. Y. Forest, Fish and Game Com. Bul. 2, pp. 25, pls. 14*).—A revision and enlargement of Instructions for Reforesting Land (E. S. R., 21, p. 143).

Results of experiments in tree planting on Sable Island, W. SAUNDERS (*Canada Expt. Farms Rpts. 1910, pp. 54, 55*).—A brief report on the experiments in tree planting undertaken at Sable Island in 1901 (E. S. R., 14, p. 152).

The experiments have been practically a failure owing to the high winds and drifting sand. Of the small number of specimens alive from the planting of 1901, none of the trees have proved promising and only two of the ornamentals, *Rosa rugosa* and *Lycium europæum*, can be said to be thrifty.

Forest nursery stock for distribution in the spring of 1910, A. F. HAWES (*Vermont Sta. Circ. 4, pp. 4*).—A brief description is given of the character and quantity of nursery stock available for distribution in 1910, together with directions for planting and cost of planting operations.

DISEASES OF PLANTS.

Report on plant diseases in Ohio for 1909, A. D. SELBY (*Ohio State Hort. Soc. Ann. Rept., 43 (1910), pp. 77–88*).—The author discusses the more prominent diseases of orchard fruits, small fruits, shade trees, and truck, grain, and forage crops, special attention being given to apple spraying and spray injuries, in which the results obtained by using a modified Bordeaux mixture made by adding iron sulphate as a sticker are compared to those obtained by the use of Bordeaux mixture alone. Tests are also reported on the use of arsenate of lead, and self-boiled lime-sulphur sprays.

As a result of these experiments it is claimed that the Bordeaux mixture and iron sticker modification is a most promising and useful spray for apple orchards, and that it may be advisable to use 3 lbs. of the iron sulphate in place of 4 lbs., making the formula 2 : 3 : 5 : 50.

The smuts and rusts of Utah, A. O. GARRETT (*Mycologia, 2 (1910), No. 6, pp. 265–304*).—This is a catalogue of rusts and smuts collected by the author in Utah, including 26 species of smuts and 144 species of rusts.

[Report of the botanist on plant diseases], H. T. GÜSSOW (*Canada Expt. Farms Rpts. 1910, pp. 251–279, pls. 2, figs. 5*).—General directions are given regarding the dissemination and control of the common diseases of cereals, potatoes, fruit trees, grapes, etc., due to fungus or bacterial agencies.

Notes on mycology and plant pathology, E. GRIFFON and A. MAUBLANC (*Bul. Soc. Mycol. France, 25 (1909), No. 1, pp. 59–63, figs. 3*).—The authors describe as new the following economic fungi: *Colletotrichum ixoræ* on *Ixora alba*, *Dichomera carpini* on *Carpinus betulus*, *Næmospora jasmini* on *Jasminum officinale*, and *Chætophoma erysiphoides* on *Quercus ilex*.

Plant diseases; potato spraying, B. F. LUTMAN (*Vermont Sta. Bul. 153, pp. 619–629*).—A report is made on the plant diseases and potato spraying experiments of 1909. On account of the dry season, no serious outbreaks of disease on economic plants occurred.

The potato spraying experiments were conducted for the purpose of determining what constituent of Bordeaux mixture causes the increased yield from sprayed plats. The yields from plats sprayed with Bordeaux mixture, Bordeaux mixture and iron sulphate, iron sulphate and lime, and Bordeaux mixture sprayed on the soil, were compared. It was found that only the sprays containing copper showed any increased yield over the check plats, and the conclusion is drawn that in addition to its fungicidal value, the copper spray when applied to the foliage acts as a stimulant to the plants, and thus increases the yield of marketable tubers sufficiently to more than pay all the expenses of spraying.

Notes on Chilean fungi, I, R. THAXTER (*Bot. Gaz., 58 (1910), No. 6, pp. 430–432, pls. 2, fig. 1*).—The author describes as new three parasitic fungi, viz, *Taphrina entomospora* on the living leaves of the antarctic beech (*Nothofagus antarctica bicrenata* and *N. artarctica uliginosa*); *Uncinula nothofagi*, usually associated with the Taphrina on the diseased leaves of *N. antarctica bicrenata;*

and *U. magellanica*, on Taphrina-diseased leaves of *N. antarctica bicrenata*. Attention is also called to the constant association of *Microsphæra alni* with *Æcidium magellanicum* on *Berberis buxifolia*.

Three interesting species of Claviceps, F. L. STEVENS and J. G. HALL (*Bot. Gaz., 50 (1910), No. 6, pp. 460–463, figs. 8*).—By planting the hibernated sclerotia of *Sclerotium paspali* in moist earth, the authors obtained the ascigerous stage of two species of Claviceps which are described as new, viz, *C. paspali* and *C. rolfsii*, both producing yellow to gray, globose-roughened sclerotia in the spikes of *Paspalum læve* and *P. dilatatum*.

In the same manner the ascigerous stage of a third Claviceps was obtained from the smooth, white to dark brown or black, nearly conical sclerotia which were found protruding from the basal ovulate portions of the spikes of *Tripsacum dactyloides*. This is also described as a new species, *C. tripsaci*.

Fusarium epidemics on cucumbers, peas, and grain, E. VOGES (*Deut. Landw. Presse, 37 (1910), No. 93, pp. 1012–1014, figs. 5*).—The author claims that in years which are noted for epidemics of Fusarium diseases, the weather conditions, such as prolonged wet and cloudy periods, are the determining factors, producing a weakened condition of the host plants which permit the parasitic fungi to gain a foothold and spread rapidly in the tissues of the host.

In the case of the Fusarium on the wheat, where many of the spikes were partially or totally blighted, being either entirely sterile or containing many shriveled grains, a microscopic examination of the sections of grain from the diseased stalks showed the presence of mycelium in the starchy portions of the endosperm. Experiments also showed that sound grains could be infected by contact with diseased grains, and that infection could also be produced through spores.

On the spongy bodies, spheres, and globular bodies present in the cells of bracken (Pteris) and potato, A. S. HORNE (*Centbl. Bakt. [etc.], 2. Abt., 28 (1910), No. 12–15, pp. 403–408, pls. 3*).—The author discusses the structure of certain globular bodies found in the young cells of the growing points of Pteris and potato, which exhibit a remarkable form resemblance to plasmodia, sporangia, spores, etc., of certain chytridiaceous organisms.

Conservation of the purity of soils in cereal cropping, H. L. BOLLEY (*Science, n. ser., 32 (1910), No. 825, pp. 529–541*).—Attention is called to the deterioration in yield of wheat, flax, and oats in many sections of the northwestern United States, due in most instances, it is claimed, to the unsanitary methods of handling the soil, the crop, and the seed.

It is claimed that the older wheat fields are sick throughout, or in large areas, in exactly the same sense that certain cotton lands are sick with root rots, or flax lands flax-sick. This wheat-sick soil condition is said to be due to at least 5 parasites which enter the seed wheat before maturity and are carried over to the next generation. When once introduced into the soil they persist there for a number of years, doing more or less damage according to weather, soil, and fertilizers.

It is stated that these wheat-sick soils are found in every county in North Dakota, and that they extend into South Dakota, Minnesota, Indiana, Washington, California, Kentucky, New York, and Alberta, Manitoba, and Ontario. The parasites have been found in seed imported from Russia, Italy, France, and Algeria, and have been taken from samples of stems and roots from almost every important wheat area of Minnesota and North Dakota.

It is claimed that the 3 most destructive parasites, taken in their order, are one or more species of Helminthosporium, Fusarium, and Colletotrichum, all of which are found on the roots, leaves, stems, and seeds of wheat, while various species of Macrosporium and Alternaria are great blighters of seed, and are destructive both on the straw and on the grain, especially at germination time. These organisms are not only parasites in their ability to attack young, growing plants, but whenever a plant tends to sicken and die, they readily attack and overcome it, so that poor drainage, drought, heat, frost, and insect injuries greatly facilitate the destruction.

It is claimed that with the understanding and application of the proper methods of selecting and disinfecting seed, rotating crops, and perfecting the seed bed, it should be possible, at least on virgin soils, to maintain for many years the high yields of from 30 to 60 bu. per acre, instead of dropping in a few years to the low average of from 12 to 15 bu.

On the formation of bacterial zoogl{oe}a on the roots of barley, H. Zikes (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl., 119 (1910), I, No. 1, pp. 11–31*).—Previously noted from another source (E. S. R., 23, p. 741).

A yellows of oats, H. Clausen (*Mitt. Deut. Landw. Gesell., 25 (1910), No 44, pp. 631–639, figs. 3*).—A description is given of a disease of oats which has been known for many years in certain parts of Germany and Holland. In this the plants look strong and healthy for a time, but later spots appear here and there in the oat fields containing plants, in which the lower leaves lose their chlorophyll, either entirely or only along the midrib, as well as their turgidity, causing them to become wrinkled, wilted, and yellowed, while the more severely attacked plants fall over on the ground. After a few weeks the disease ceases, and those plants not too severely attacked recover, but the yield is always reduced.

It is claimed that the disease is not caused by dry weather, as is usually supposed, nor by parasitic agencies, but is apparently due to the kinds of artificial fertilizers used.

After comparing the results of several years' experiments concerning the effects of fertilizers on this disease, the author draws the following conclusions: A direct application of lime should be omitted; ammonium sulphate should be used in place of nitrate of soda; the phosphoric acid should be in the form of superphosphate in place of Thomas slag; and the soil after planting should be thoroughly rolled down.

Black scab or wart disease of potatoes, G. T. Malthouse (*Field Expts. Harper-Adams Agr. Col. and Staffordshire Joint Rpt. 1908, pp. 19, 20, figs. 5*).—In a brief summary of the known facts concerning this disease it is claimed that the principal sources of infection are seed tubers diseased by manure containing spores, and in some instances by poultry. Sulphur at the rate of $\frac{1}{4}$ lb. per square yard is said to be the best remedy.

The mosaic disease of tomatoes, Johanna Westerdijk (*Meded. Phytopath. Lab. Willie Commelin Scholten, 1910, Mar.; abs. in Ztschr. Pflanzenkrank., 20 (1910), No. 7, pp. 425, 426*).—From a study of the disease in the field and under glass by infection and seed experiments, the author draws the following conclusions: First, the disease is produced by an infectious virus, for which no organisms have yet been found; second, the virus is able to infect only embryonic tissues, where it produces two different symptoms as the plants develop, one, the usual mosaic markings, and the other a species of monstrosity which is found only in artificially infected plants; third, the virus when dried retains its virulence for a long time, but is destroyed by heating at a temperature of from 50 to 100° C.; fourth, the mosaic disease of the tomato, contrary to that of the tobacco, is inheritable; fifth, the tomato virus is distinct from that of the tobacco, and will infect only its proper host plant.

Combating diseases and insects of the orchard, W. H. Chandler (*Ann. Rpt. Mo. Bd. Hort., 3 (1909), pp. 345–391, pls. 21*).—The author gives the symptoms and remedies of diseases of the orchard and garden under Missouri conditions, directions for the proper preparation and application of the various standard fungicides and insecticides, a list of the different types of sprayers and where they can be purchased, data as to the cost and value of spraying, and a list of publications on the use of sprays.

Apple canker (Nectria ditissima), A. DUCLOUX (*Rev. Hort.* [*Paris*], *82* (*1910*), *Nos. 21, pp. 506–508; 22, pp. 520–523*).—The distribution and severity of this disease in France is given, together with resistant and susceptible varieties and their pomological characters.

"Sooty blotch:" A new fungus disease of apples, E. S. SALMON (*Gard. Chron., 3. ser., 48* (*1910*), *No. 1251, p. 443, figs. 2*).—Attention is called to the appearance in England for the first time of the sooty blotch (*Phyllachora pomigena*) on certain varieties of apples, where it spreads in storage, causing considerable damage to the fruit.

The control of Fusicladium, E. VOGES (*Ztschr. Pflanzenkrank., 20* (*1910*), *No. 7, pp. 385–393; rev. in Gard. Chron., 3. ser., 48* (*1910*), *No. 1250, p. 432*).—In a general discussion of the means of combating the apple scab (*F. dendriticum*) it is claimed that the chief danger of reinfection in the spring lies in the hibernation of the fungus in the young shoots. Winter spraying, however, is of little value as the fungicide is unable to reach the bulk of the mycelium in the infected shoots. Spring spraying has proved to be the most efficient means of controlling this disease.

The development of Gnomonia erythrostoma, the cause of cherry leaf scorch disease, F. T. BROOKS (*Abs. in Proc. Cambridge Phil. Soc., 15* (*1910*), *No. 6, pp. 534, 535*).—The present investigation concerns an examination of the life history of the fungus from the cytological standpoint. The author summarizes the life history of this pyrenomycete, stating that infection of the foliage occurs in the early summer by means of the ascospores. Spermogonia and "coils" are formed in the diseased leaves, the coils ultimately developing into perithecia. During the summer the vegetative mycelium passes down the leaf stalk and prevents the formation of the absciss layer. On this account the diseased leaves remain on the trees throughout the winter and become the source of reinfection the following season.

The morphological and cytological characters of the fungus are described at some length.

Winterkilling of twigs, cankers, and sun scald of peach trees, F. M. ROLFS (*Missouri Fruit Sta. Bul. 17, p. 101, pls. 13*).—This bulletin deals with a diseased condition of peach trees, often designated as winterkilling of the twigs, cankers of the limbs, and sun scald of the limbs and trunks. The results are also given of cultures of *Valsa leucostoma* on artificial media and of inoculation experiments with this fungus on living wood of various species of the Amygdalaceæ. The hyphæ of this fungus were usually found associated with the diseased condition described, especially when the trees had been weakened by winter injuries or from other causes.

Infections on the limbs and trunks of normal trees often produce cankerous wounds, while on trees weakened from any cause, especially when the root system is invaded by one of the root rot organisms, sun scald areas may develop. The perithecial stromata form abundantly on the limbs and trunks of the trees, rarely on the twigs, while the pycnidial stromata usually develop freely on the twigs and branches, but may also be found on the larger limbs and trunks. The pycnidia and perithecia usually develop in distinct stromata, but occasionally mixed stromata occur. The fungus grows readily on most media, but is most characteristic on the Hiss plate media.

The pycnidial stage of this fungus is known as *Cytospora cincta*. Cultures from both forms develop on the various media only conidia, which occur in both open and closed pycnidia, but when the cultures of either form were inoculated on peach limbs both pycnidial and perithecial stromata finally developed.

Cultures of Valsa and Cytospora from apricot, cultivated cherry, wild cherry, peach, and plum trees, when inoculated on peach trees produced similar wounds. It is claimed that sufficient variations in the cultures from the five hosts were found to warrant the formation of two distinct varieties of the fungus, viz, *V. leucostoma cincta* n. var. on the cultivated and wild cherry and the peach, and *V. leucostoma rubescens* n. var. on the apricot and plum.

Fall applications of lime sulphur and Bordeaux mixture reduced the number of twig infections, while the destruction of all dead and diseased limbs and twigs and the excision of infected tissues on the branches and trunks materially reduced the number of infections the following year.

A bibliography is included.

Spraying for the control of peach brown rot and scab, W. M. Scott (*Ann. Rpt. Mo. Bd. Hort., 3 (1909), pp. 256–266*).—In a paper read before the Missouri State Horticultural Society, the author summarizes the results of work done during 1909 at Fort Valley, Ga., in controlling peach brown rot, scab, and curculio with lime-sulphur mixture (8:8:50) and arsenate of lead sprays, previously reported from other sources (E. S. R., 23, pp. 150, 745).

Control of pear blight on the Pacific coast, P. J. O'Gara (*Better Fruit, 5 (1910), Nos. 2, pp. 49–51, 54–56; 5, pp. 30–43, 52–57, figs. 8*).—A discussion is given of the history, origin, progressive dissemination on the Pacific coast, characteristics, and methods of combating pear blight (*Bacillus amylovorus*) on both pear and apple trees.

Attention is called to the fact that the quince, wild crab apple (*Pyrus rivularis*), hawthorne (*Cratægus douglasii*), service berry (*Amelanchier alnifolia*), mountain ash (*Sorbus occidentalis*), Christmas berry (*Heteromeles arbutifolia*), and other wild fruits belonging to the Pomaceæ are more or less subject to this disease, while the loquat and some varieties of plums and apricots are also attacked.

The two main methods of infection are through the nectaries of the blossoms and the tender tips of growing twigs or watershoots, but occasionally it enters by means of growth cracks and crown galls directly into the tender, growing, fleshy bark.

It is claimed that the only way to control blight is to remove all cases of hold-over canker before the blossoming period by a system of careful inspection and pruning. Summer cutting of blight should always be done, but to be effective it must be thoroughly done. In order to render the fight against this disease easier, the trees should be pruned to the vase or open-head type, and all watershoots and fruit spurs kept off the body and main limbs of the tree, while watershoots, whether from the crown of the tree or from the root system, and crown galls should also be pruned off. It is also suggested that the use of scions on resistant stocks, such as the Winter Nelis and Kieffer, be used as a means of combating this disease.

Silver-leaf disease, F. T. Brooks (*Gard. Chron., 3. ser., 48 (1910), No. 1248, p. 395*).—In a brief note on this disease the author states that he has been unable to produce silvering in plum trees by inoculating uncontaminated spores of *Stereum purpureum* into healthy trees, but that the silvering may possibly ensue the next year.

Pure cultures of the mycelium of this fungus have also been used for inoculations, but sufficient time has not yet elapsed for any results to appear.

Gooseberry and red-currant bushes, as well as sycamore sprouts, have been found silvered. In the case of the sycamore, *S. purpureum* was found abundantly on the stump from which the affected shoots arose.

Crown gall, G. MASSEE (*Roy. Bot. Gard. Kew, Bul. Misc. Inform., 1910, No. 9, pp. 309–312, pl. 1; Jour. Bd. Agr. [London], 17 (1910), No. 8, pp. 617–620, pl. 1*).—Attention is called to the presence of crown gall on plums, roses, raspberries, and chrysanthemums in various sections of England. The disease seems to be caused by *Dendrophagus globosus* alone, as no traces of *Bacterium tumefaciens* have yet been found in the diseased tissues.

New experiments on the control of the American gooseberry mildew, WAGNER (*Landw. Ztschr. Rheinprovinz, 11 (1910), No. 35, pp. 527, 528*).—The tests were made under the direction of the Chamber of Agriculture of the Rhine Province at Alfter, near Bonn, and consisted of experiments with 50 per cent lime-sulphur mixtures, 5 per cent solutions of cucasa, and 10 per cent solutions of carbolineum.

It was found that one treatment with any of these sprays proved unsatisfactory in controlling the mildew. It is stated that the most satisfactory method so far known of combating the disease is a careful cutting back during the winter months of all plants infected with the mildew.

The treatment of the mildew in 1910, R. BRUNET (*Rev. Vit., 34 (1910), No. 879, pp. 421–456, figs. 3*).—After giving the answers received to an inquiry sent to various vineyardists throughout France concerning the methods used and results obtained in combating the mildew, the author claims from the evidence presented that alternately spraying with Bordeaux mixture and dusting the vines and fruit with sulphur powders to which has been added 5 to 10 per cent of copper sulphate, proved to be a most efficient preventative of the mildew during this season.

The use of salts of silver in place of copper salts proved valueless in combating the mildew.

The breeding of grape hybrids resistant to Peronospora, G. SERLUPI (*Rivista [Conegliano], 4. ser., 16 (1910), No. 22, pp. 511–518*).—The general qualities and characteristics of about 24 hybrids bred with special reference to their resistance to Peronospora are described. Some of these hybrids seem to be very immune to the disease.

Studies on the Rœsleria of the grape, P. VIALA and P. PACOTTET (*Ann. Inst. Nat. Agron., 2. ser., 9 (1910), No. 2, pp. 241–252, figs. 12; Rev. Vit., 34 (1910), Nos. 875, pp. 320–323, figs. 2; 876, pp. 350–354, figs. 8; 877, pp. 379–382, figs. 3; 880, pp. 466–471, figs. 8; 883, pp. 550–557, figs. 9*).—The authors report the results of investigations on the life history of this fungus, including a discussion of its probable parasitism and studies on its mycelium, fruiting stages, isolation in culture media, conidiophore formation on the roots of grapevines and in cultures, and the production of chlamydosporic fructifications in liquid culture media.

Pecan scab, M. B. WAITE (*Science, n. ser., 33 (1911), No. 837, pp. 77, 78*).—In a paper read before the December meeting of the Botanical Society of Washington, the author discussed the characteristics of a scab fungus (*Fusicladium effusum*) of the pecan, which is especially injurious to certain varieties, such as the San Saba and Sovereign, when carried from their native habitat in the dry regions of western Texas to the humid conditions of the Gulf Coast States and the Carolinas.

The fungus attacks the young leaves as they unfold, the young growing twigs, and especially the nuts, causing a partial or total destruction of the crop. As the nuts continue to develop during the summer, every warm, rainy, humid spell produces fresh infections. It was found that much of the infection occurred through punctures made by the pecan plant louse along the veins of the leaves, but the fungus was also able to enter the leaves directly. The fungus is assisted in its germination and growth by the honeydew secreted by these aphids.

Spraying with Bordeaux mixture controlled the scab thoroughly, also lime-sulphur solution, which killed the aphids, but the best remedy is the cultivation of scab-resistant varieties of pecans which have originated in Louisiana or other humid regions, of which there are many fine varieties.

Rhizina undulata, F. T. Brooks (*Quart. Jour. Forestry, 4 (1910), No. 4, pp. 308, 309*).—Attention is called to the destructive nature of this fungus to young coniferous plantations, as evidenced by its ravages in a mixed plantation of beech, ash, and conifers located on larch land where the old larch stumps were left to decay in situ. Only the conifers were attacked, and their infection was caused by the mycelium of the fungus spreading underground from the decaying roots of the old stumps to the roots of the healthy trees.

Injuries to pines from late frosts, Dengler (*Ztschr. Forst u. Jagdw., 42 (1910), No. 11, pp. 670–674, pl. 1*).—Attention is called to a disease of pine needles, in which yellowish areas appear in the middle of the leaves while the base and tip remain green. The needles on the ends of the terminal and more exposed young developing shoots are the most frequently diseased, especially on 3 to 8 year old trees. These discolored needles show no evidences of parasitic attacks, and the author claims that the disease is caused by late frosts in May and June.

Witches' broom on spruce and larch, K. von Tubeuf (*Naturw. Ztschr. Forst. u. Landw., 8 (1910), No. 7, pp. 349–351; rev. in Quart. Jour. Forestry, 4 (1910), No. 4, pp. 309, 310, pl. 1*).—In 1907 the author planted spruce seed obtained from a witches' broom which bore cones. The majority of the seedlings thus obtained, which are now in their fourth year, appear to be normal, but a few are densely bushy, being in fact witches' brooms.

From this fact the author suggests that the witches' brooms are due to inheritance, being in reality a de Vries mutation which is transmitted from parent to offspring, not only in the spruce, but probably also in the pine and larch, which often bear witches' brooms.

The spruce scab (Lophodermium macrosporum), E. Mer (*Rev. Gén. Bot., 22 (1910), No. 260, pp. 297–336; Bul. Soc. Nat. Agr. France, 70 (1910), No. 6, pp. 541–553*).—A detailed description and general discussion of the two forms of this disease are given, including the range, characteristics, time of fruiting, methods of dissemination, and duration of the life cycle of each form.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Raising deer and other large game animals in the United States, D. E. Lantz (*U. S. Dept. Agr., Bur. Biol. Survey Bul. 36, pp. 62, pls. 8*).—This bulletin calls attention to the importance of raising elk and deer for venison, indicates the particular species most readily reared in preserves, and emphasizes the importance of so modifying state game laws as to encourage the use of private effort and capital in making a marketable commodity of venison. Several States have changed their game laws in the interest of this industry since the publication on deer farming previously noted (E. S. R., 20, p. 349) was issued. The author deals with the subject under the main headings of importance of domesticating mammals, selection of species for rearing experiments, the wapiti or Rocky Mountain elk, the whitetail or Virginia deer, and game propagation and game laws.

Twenty-fifth report of the state entomologist, 1909, E. P. FELT (*N. Y. State Mus. Bul. 141, 1910, pp. 178, pls. 22*).—The author briefly summarizes the work of the year and deals at length with the more important investigations.

An experiment with the house fly has been previously noted (E. S. R., 23, p. 359). Experiments with the brown-tail moth (E. S. R., 22, p. 461) reported in detail "show in a striking manner the futility of depending upon any method of fumigation with hydrocyanic acid gas for the purpose of destroying active caterpillars, not to mention the more resistant dormant larvæ." Tests made with scalecide diluted 1 part to 20 resulted in the death of all the caterpillars even when the period of immersion was limited to half a minute. A summarized account of the codling moth and details of spraying experiments conducted, a summary of which has been previously noted (E. S. R., 23, p. 658) follow, a bibliography supplementary to that given by Slingerland in 1898 (E. S. R., 10, p. 460) accompanying the account.

Notes are given on the life history of the hickory leaf stem borer (*Acrobasis feltella*), which was abundant upon young hickories at Warner; on the rhododendron lace bug (*Leptobyrsa explanata*), which was the source of considerable complaint; and on the various plant lice that were abundant during the year, their natural enemies, remedial measures, etc. The fruit tree pests noted include the fruit tree bark beetle (*Eccoptogaster rugulosus*), cankerworms, tarnished plant bug, rose leaf hopper (*Typhlocyba rosæ*), San José scale, West Indian peach scale (*Aulacaspis pentagona*), oyster-shell scale, and blister mite. The small fruit insects noted include the grape blossom midge (*Contarinia johnsoni*) and tree crickets (*Œcanthus* sp.). Mention is made of several shade tree and forest insect pests, namely, elm leaf beetle (*Galerucella luteola*), bronze birch borer (*Agrilus anxius*), sugar maple borer (*Plagionotus speciosus*), European elm case bearer (*Coleophora limosipennella*), false cottony maple scale (*Phenacoccus acericola*), elm spanworm, spruce bud moth (*Tortrix fumiferana*), and hickory bark borer (*Eccoptogaster quadrispinosus*). Other insects noted are Say's blister beetle (*Pomphopœa sayi*), the army-worm, luminous larvæ (*Phengodes plumosa*), and a museum pest (*Anthrenus verbasci*).

Lists are given of the principal publications of the entomologist during the year, additions to the collection, and insect types in the New York State Museum. An Additional List of Adirondack Insects, prepared by D. B. Young (pp. 123–125), is appended to the report.

Notes of the season in Connecticut, W. E. BRITTON (*Jour. Econ. Ent., 3 (1910), No. 5, pp. 434–436*).—Among other important insects of the year the author mentions the appearance of the brown-tail moth at Thompson and Putnam, thought to be due to the natural spread of the pest, and an outbreak of *Bucculatrix canadensisella* on birch.

Report of entomological work, A. E. STENE (*Ann. Rpt. Bd. Agr. R. I., 25 (1909), pp. 39–91, pls. 12, fig. 1*).—Reports are here presented of nursery inspection, and the San José scale, elm-leaf beetle, and tussock, gipsy, and brown-tail moth work of the year.

Report of the entomologist, C. G. HEWITT (*Canada Expt. Farms Rpts. 1910, pp. 223–250, pls. 3*).—A somewhat detailed account is given of the occurrence of the insect pests of the year with the remedial measures applicable.

During this period the white grub was one of the most injurious insects, potatoes being severely attacked in many counties in Ontario, and also in Quebec and Prince Edward Island; in some cases from 12 to 15 grubs were found in a single hill, the potatoes not being worth digging. Numerous complaints of injury to potatoes by wireworms were also received from different provinces from Nova Scotia to British Columbia; in Ontario they were the chief pests of which complaints were received as destroying new fall wheat; and in Nova Scotia they destroyed corn which had grown about 2 ft. in height. Other insects reported upon include root maggots, the woolly apple aphis, the oyster shell, San José and terrapin scales, the brown-tail moth, codling moth, eye-spotted bud moth, apple maggot, plum curculio, cankerworms, Hessian fly, locusts, the hop flea-beetle, the potato flea beetle (*Epitrix cucumeris*), blister beetles, cutworms, the larch sawfly (*Nematus erichsonii*), spruce bud-worm (*Tortrix fumiferana*), bark beetles, the Eastern spruce beetle, bronze birch borer (*Agrilus anxius*), ribbed rhagium (*Rhagium lineatum*), and the birch leaf-mining sawfly (*Phlebatrophia mathesoni*). Brief notes are also given on insects injurious to garden and greenhouse crops, household insects, mites, and other pests.

A brief report on the apiary, by D. D. Gray, is appended.

How to control the pear thrips, S. W. Foster and P. R. Jones (*U. S. Dept. Agr., Bur. Ent. Circ. 131, pp. 24, figs. 15*).—This circular is stated to be an abstract of a more comprehensive report to be published on life history and control investigations of the pear thrips conducted since those previously noted (E. S. R., 21, p. 755) were reported. Conservative estimates place the damage caused by this insect in the Santa Clara Valley alone, during the years from 1904 to 1910 at nearly \$2,000,000, while the loss for the entire State during this period probably exceeds \$3,500,000. It is estimated that the thrips in the absence of treatment would cause an average yearly loss to the State of over \$1,000,000.

"On pears the greater injury is produced by the adults, which often prevent the trees from blooming, while on prunes and cherries the larvæ frequently prevent a crop of fruit from setting after the trees have come into full bloom. Also, the deposition of eggs into the fruit stems of prunes and cherries so weakens the stems that much of the young fruit falls."

In recording life history studies, tables are given which show the total daily emergence of thrips from cages, at San José, Cal., 1909–10; emergence of thrips from cages placed in the ground under trees in pear and prune orchards and from soil samples taken from orchards in November and December and kept in cages in the laboratory, at Walnut Creek, Cal.; and from cages placed in the ground under trees in orchards and from samples taken from orchards in November and December and kept in cages in the laboratory, at Suisun, Cal.

In experiments conducted in which various insecticides were tested, it was found that a tobacco extract containing 2¾ per cent nicotine, diluted at the rate of 1 to 60 in a 6 per cent distillate-oil emulsion, killed all the thrips touched and penetrated well into the pear cluster buds. Directions are given for the preparation of an emulsion, which can be made at a cost of about 5 cts. per gallon for the concentrated article. The commercial results obtained from some of the numerous large scale experiments and demonstrations carried out in pear, prune, and cherry orchards during the season of 1909–10 are reported. While the sprayings necessary to control the thrips are expensive, the outlay of money and labor gives large returns, many experiments in spraying showing net returns of from \$100 to \$600 per acre more than was secured from adjoining untreated areas. Since the thrips work rapidly and may destroy all prospects of a crop in less than a week's time, the spraying must be done thoroughly and at a time to kill the thrips before the fruit buds have been destroyed. It is recommended that where possible the land be plowed and irrigated in the fall and followed by a thorough spraying in the spring.

On some new species of leaf-hopper (Perkinsiella) on sugar cane, F. Muir (*Hawaiian Sugar Planters' Sta., Ent. Bul. 9, pp. 11, figs. 5*).—The forms belonging to the genus here considered (Perkinsiella) prefer the sugar cane as a food plant only occasionally being found on other grasses. The author presents a table for the separation of the 13 species recognized as belonging to the genus. The 8 species here described as new are *P. pallidula* from Pontianak, Borneo; *P. ratilei*, *P. bicoloris*, *P. variegata*, *P. papuensis*, and *P. lalokensis* from Laloki River, British New Guinea; and *P. amboinensis* and *P. fuscifrons* from the Island of Amboina, all from sugar cane.

The San José scale and some experiments for its control, E. L. Worsham and W. W. Chase (*Ga. Bd. Ent. Bul. 31, 1910, pp. 23, figs. 8*).—Spraying experiments conducted from 1907 to 1909, in which several proprietary sprays, prepared lime-sulphur solutions, homemade lime sulphur, and powdered lime and sulphur were used, are briefly reported.

"While each oil was applied as a spring treatment and as a fall treatment, it was found in every case that the fall treatment was of superior effectiveness. The earlier the spray can be applied after the leaves have fallen, the better will be the net results, all other conditions being equal. . . .

"The concentrated lime and sulphur solutions, being free of all solid matter, offer no more serious obstacles to easy spraying than the oils. . . . Compared to the soluble oil compounds for efficiency, they yield quite as good results as the best oils, even when the latter are used at a greater strength than that recommended by the different manufacturers. . . . Besides its strictly insecticidal value, lime and sulphur possesses fungicidal properties to a much greater degree than it is possible to incorporate in a soluble oil. There is hardly any danger of injuring trees even when used at much greater strength than those recommended by the manufacturers."

The Coccidæ of Audubon Park, New Orleans, La., T. C. Barber (*Jour. Econ. Ent., 3 (1910), No. 5, pp. 420–425*).—The author presents an annotated list of 34 species.

The Coccidæ of Boulder County, Colorado, T. D. A. Cockerell (*Jour. Econ. Ent., 3 (1910), No. 5, pp. 425–430, pl. 1*).—This list includes the various species of scale that have been introduced on plants.

Parasites of the gipsy and brown-tail moths introduced into Massachusetts, W. F. Fiske (*Boston, 1910, pp. 56, figs. 15*).—In this popular account of the work with parasites the author considers the nature of insect parasitism, natural control of the gipsy moth, parasite introduction in theory and practice, the sequence of parasites, the parasites of the gipsy moth in Japan, Europe, and America, progress of the parasites in Massachusetts, parasites of the brown-tail moth, etc. It is shown that a sequence of parasites, which will attack the moth in different stages of its development, and all the component members of which will work together in harmony, is absolutely necessary before the best results may be expected.

Summarized accounts are given of some of the more important parasites, namely, *Anastatus bifasciatus* and *Schedius kuvanæ* which attack the eggs; *Glyptapanteles fulvipes*, *Blepharipa scutellata*, *Compsilura concinnata*, *Tachina larvarum*, *Tricholyga grandis*, *Zygobothria gilva* and *Carcelia gnava* which destroy the caterpillars; and *Theronia* sp., *Chalcis flavipes*, and *Monodontomerus æreus* which develop in the pupæ. A summarized statement of the probable time at which different species will become effective, pen drawings of the parasites considered, and diagrams illustrating the dispersion, numerical increase, and increase in the average abundance of an introduced insect accompany the account.

The natural control of Heterocampa guttivitta, W. F. Fiske and A. F. Burgess (*Jour. Econ. Ent., 3 (1910), No. 5, pp. 389–394*).—In counts made of eggs of *H. guttivitta* collected at Mount Kearsarge, N. H., about the middle of June, 87.5 per cent were found to be parasitized by a proctotrypid which appears to be *Telenomus graptæ*. Records of pupæ collected in New Hampshire during August show 87 per cent to have been destroyed by the larvæ of *Calosoma frigidum*. "What conditions could have brought about the remarkable increase of the latter species during the past few years is difficult to conjecture, but there can be no question of the effective manner in which they have supplemented each other's work and reduced the numbers of Heterocampa to a minimum." The enormous increase of *C. frigidum* in southern Maine is thought to be due to a general migration from Heterocampa districts to gipsy and brown-tail moth regions.

Report of field entomologist, G. P. Weldon (*Colorado Sta. Rpt. 1909, pp. 31–35*).—This report, which relates particularly to work conducted in the orchards of Mesa and Delta Counties, deals largely with the codling moth.

The season's observations, as well as the experience of orchardists, indicate that "a spray such as is thrown by a good Vermorel type nozzle with the coarse caps, and which collects in little globules in the calyx cup, will penetrate beneath the base of the stamens to the lower calyx cup better, in all probability, than when driven in with a coarse nozzle of the Bordeaux type and 200 lbs. pressure."

Experiments conducted in a number of orchards with varying amounts of arsenate of lead per 100 gal. of water gave the following results: 2½ lbs., 21 per cent wormy; 3 lbs., 30 per cent; 3½ lbs., 25 per cent; 4 lbs., 41 per cent; 5 lbs., 38 per cent; and 6 lbs., 22 per cent. Ninety-five per cent of the apples on a Ben Davis tree in an unsprayed orchard were found to be wormy, while many orchards in the same locality sprayed only once while the calyces were open had only 6 per cent wormy.

In spraying experiments conducted on a block of 215 trees in an orchard at Eckart, the following results were obtained: With "Black Leaf," 1 part to 50 parts water, 23 per cent wormy; sulphate of nicotine, 10 oz. to 50 gal. water, 30 per cent; sulphate of nicotine, 12 oz. to 50 gal. water, 27 per cent; lime, 25 lbs. to 50 gal. water, 41 per cent; unsprayed trees, 41 per cent; sulphid of arsenic, 1 gal. to 50 gal. water, 7 per cent; sulphid of arsenic, ½ gal. to 50 gal. water, 6 per cent; arsenate of lead, 2 lbs. per 100 gal. water, 5 per cent; arsenate of lead, 3 lbs. per 100 gal. water, 4 per cent; and arsenate of lead, 4 lbs. per 100 gal. water, 4 per cent.

These results have led the author to the following conclusions: "Nicotine preparations are of very little value, if any, in controlling the codling moth. Sulphid of arsenic is practically as good as arsenate of lead, and further experiments will probably show that it is entirely as good. Two lbs. of arsenate of lead per 100 gal. of water is enough, when carefully weighed and applied, to do excellent work. . . . A Vermorel type nozzle is just as efficient as a Bordeaux type and does not waste so much of the spray. A low pressure is practically as good as a high, provided enough pains are taken to do thorough work. It is easier, however, to do thorough work with a high pressure machine. One spraying given at the time the calyx is open is sufficient in certain localities, at least, to control the codling moth."

The San José scale was found in 15 orchards but is thought to have been practically exterminated in 2 of these.

The orange tortrix (Tortrix citrana), H. J. Quayle (*Jour. Econ. Ent., 3 (1910), No. 5, pp. 401–403*).—This insect is reported to have been the source of injury during the season of 1909–10 in certain sections of the southern California citrus belt, being most abundant in Los Angeles County from Glendale to Pomona. In some of the packing houses during the early part of the shipping season the amount of wormy fruit ran between 5 and 10 per cent. The injury to oranges is due to burrows made in the fruit which usually go no farther than through the rind. In July it was reported to be attacking various greenhouse plants at San Luis Obispo.

The eggs hatch in 12 days, the total length of the larval life is from 55 to 60 days, and the pupal period from 9 to 12 days in midsummer. It is thought that there are probably 3 generations, or 2 and a partial third.

Picking up and destroying the dropped fruit in the field while the larva is still in its burrow and destroying the wormy culls as they are sorted at the packing house is said to be the most feasible remedy.

Preventive and remedial work against mosquitoes, L. O. Howard (*U. S. Dept. Agr., Bur. Ent. Bul. 88, pp. 126*).—In this bulletin, the first to be issued of a series on mosquitoes, the author deals at length with the work that has been carried on against these pests. The subject is taken up under the headings of protection from bites, abolition of breeding places, deterrent trees and plants, smudges and fumigants, apparatus for catching adult mosquitoes, remedies for mosquito bites, drainage measures, the value of reclaimed lands, the practical use of natural enemies of mosquitoes, destruction of larvæ, organization for community work, and examples of mosquito exterminative measures in different parts of the world and the sanitary results following them.

In summarizing the work as related to this country the author finds "that considering the economic loss existing in the United States through malaria, nothing like the competent work has been done that should have been done, or really that should have been done in the past 8 years within the territorial limits of the United States themselves. The United States Government has done admirable work in Cuba, for another people, and it has done excellent work in the Isthmian Canal Zone, but in its own home territory it has done nothing. State governments have done almost nothing, if we except the drainage work done in New Jersey. Malaria campaigns have been local and on the whole very unsatisfactory."

Investigations of the biology of the oxwarble fly (Hypoderma bovis) and methods of combating it, Ströse (*Arb. K. Gsndhtsamt., 34 (1910), No. 1, pp. 41–76, figs. 11*).—The author reviews the literature and reports investigations of *H. bovis*, conducted in Germany. He concludes that at least a part of the larvæ enter the body through the skin, and that as full grown larvæ they leave the host largely during the night or early morning hours.

The alfalfa leaf-weevil, E. G. Titus (*Utah Sta. Bul. 110, pp. 19–72, pls. 17, fig. 1*).—This is a detailed account of studies of the life history and bionomics and of remedial measures for the alfalfa leaf-weevil (*Phytonomus murinus*), a European pest first discovered in Utah in 1904, which threatens eventually to reach all our alfalfa growing regions. A preliminary report of the author's investigations of this pest has been previously noted (E. S. R., 22, p. 462).

A map given of its distribution up to July 1, 1910, shows Salt Lake, Summit, Davis, Weber, Morgan, Utah, Wasatch, and Tooele counties to be infested, the weevils having been found from the lower levels of the valleys (4,200 ft.) to the tops of the dividing mountain chains (7,000 to 7,500 ft.). "During the first year of the presence of the weevils there is scarcely any damage noticeable. The second year, under ordinary conditions, the alfalfa is injured from $\frac{1}{4}$ to $\frac{3}{4}$ of the first crop and from $\frac{1}{4}$ to $\frac{1}{2}$ of the second crop. The third year of infestation brings about a most serious condition. There were many fields the present year which could not be cut, and, where the alfalfa did grow to a sufficient height to allow it to be cut, it was not nearly mature and the hay was of a correspondingly less value."

Up to the present time the weevil has been found feeding and breeding in Utah on 7 species of plants, namely, alfalfa, and burr, white sweet, yellow sweet, red, white, alsike, and crimson clovers. In breeding cages the weevils refused to feed on hairy vetch (*Vicia villosa*) and the buffalo pea (*Astragalus utahensis*).

As regards distribution the author considers spring and summer flights to be the most prevalent and noticeable means. The weevils are found flying for a period of 6 weeks in the early spring, after which time the females appear to be so heavy with eggs that they are rarely seen flying and then only for short distances; the summer flight is shorter. There is thought to be very little danger of its distribution in seed coming from an infested region, where such seed has been properly cleaned by screening. It may, however, be carried with articles shipped from an infested region, and on railroads, in wagons and automobiles traveling through the places where it occurs.

The life history of the weevil for 1909 and 1910 is graphically illustrated by means of charts. "A month or 6 weeks after the first emergence of the beetles from hibernation there can be found all stages of the insect in the fields. With our present data, the life history of any one weevil will thus approximate more than a year in the adult stage or from the time the egg was laid to the death of the adult, 45 to 60 weeks; that is, the egg, 7 to 16 days; first stage of larvæ, 5 to 8 days; second stage of larvæ, 12 to 20 days; third stage of larvæ, 12 to 30 days; pupa, 6 to 14 days; and the adults 10 to 14 months." Observations indicate that it lays from 200 to 300 eggs.

Mention is made of a number of predaceous enemies but as yet no parasite has been discovered. Under remedial measures the author discusses pasturing, burning the fields, brush drags, wire sweepers, growing a second crop, gathering machines, spraying, and trapping. "It is recommended that alfalfa be disked in early spring to stimulate it to better growth. Cut the first growth when the most of the eggs have been laid (middle of May) and then brush-drag the field thoroughly. Sheep may be pastured on the fields at this time for 2 weeks and alfalfa then watered and a good crop will usually be assured. Gathering machines to capture the larvæ and beetles have given good results when used on the fields at the time the insects are most numerous. Fields should be brush-dragged again after the first crop has been cut. . . . Alfalfa should not be allowed to grow more than 7 or 8 years in infested districts."

A bibliography of 18 titles is appended.

The plum curculio and methods for its control, W. W. CHASE (*Ga. Bd. Ent. Bul. 32, 1910, pp. 5–33, figs. 11*).—"The results of the 2 years' experiments discussed in this bulletin show that curculio can be controlled largely by arsenate of lead at a ratio of 2 lbs. to 50 gal. of water, to which is added a milk of lime solution made from 3 lbs. of stone lime. Two applications are recommended, the first to be applied as the calyces or shucks are shedding, and the second 2 weeks later. In thrifty, healthy orchards where the foliage growth is dense, 3 applications are recommended. It is unsafe to spray weak trees more than twice."

Technical papers on miscellaneous forest insects, I.—Contributions toward a monograph of the bark-weevils of the genus Pissodes, A. D. HOPKINS (*U. S. Dept. Agr., Bur. Ent. Bul. 20, pt. 1, tech. ser., pp. 68, pls. 22, figs. 9*).—This bulletin embodies information relating to the destructive bark-weevils of the genus Pissodes that will serve as a basis for economic investigations and publications. "Heretofore comparatively little has been known about the North American species, and consequently there has been much confusion in collections and in published information, due to the possession of insufficient facts relating to the destructive characters and habits of the described species, and especially because of the number of undescribed species which have not been recognized or have been wrongly identified." Historical references are followed by a consideration of the taxonomy of this class of beetles, a revised classification being presented with tables for the separation of the genera. The anatomical details of the adult, larva, and pupa are considered in connection with numerous illustrations.

"The host trees of Pissodes are, so far as known, restricted to the conifers, and include Pinus, Picea, Abies, Larix, Pseudotsuga, and Cedrus. Some of the species infest both living and dying or newly felled trees, while others appear to confine their attack to those which are sickly, dying, or felled. Some of them infest the living terminals and upper branches, others the upper or middle, stem, or base; some prefer to infest the thick bark of large trees, while others show a preference for the thinner bark of saplings and poles.

"The eggs are deposited in cavities excavated by means of the beak in the outer or inner portion of the inner bark. Some species deposit one or two eggs in a single cavity, while others deposit many. The larvæ obtain their food from the inner bark through which they extend their irregular mines and when they have completed their development they excavate transformation cells, or pupal cases, in the outer portion of the wood, or, rarely, in the inner bark. These cells are enclosed by a thick covering of excelsior-like wood fiber, forming the so-called 'chip cocoons,' which are perhaps a more characteristic feature of the species of this genus than of any other.

"The characteristic features in the life history of the species are the long life of the adult, the slow sexual maturity, the long period in which eggs may be deposited by a single female, and a single generation annually. In some species the broods develop within two or three months after the eggs are deposited, while in others it requires a longer period. The adults of some of the species emerge from the bark and hibernate in the ground, while others pass the winter in the bark.

"The genus is represented in all sections of the United States characterized by natural growth of their host trees, and in other sections where such trees have been introduced to a sufficient extent to support them."

In a key and synopses of the adult, pupal, and larval characters which follow, an attempt is made toward a natural classification of the species of Pissodes into primary and secondary divisions, sections, series, etc., according to characters which indicate lines of specialization and natural affinities. Forty-two species are recognized as belonging to the genus, 30 of which occur in North America, 23 of these being described as new to science. The species described as new are: *P. similis*, from Maine, New Hampshire, and North Carolina, on *Abies balsamea* and *A. fraseri; P. utahensis* from British Columbia and Utah and *P. barberi* from California, Oregon, and Washington, their hosts not being known, but probably Picea; *P. sitchensis* from Oregon and Washington on *Picea sitchensis; P. engelmanni* from Colorado, Idaho, and Montana on *Picea engelmanni; P. approximatus*, occurring from Maine and Canada south to North Carolina on *Pinus strobus, P. rigida, P. echinata, P. resinosa, P. virginiana*, and *P. pungens; P. schwarzi*, occurring from Alberta, Canada, south to Colorado on *Pinus ponderosa scopulorum; P. canadensis* from Manitoba, host tree not known but evidently pine; *P. deodaræ* from Georgia on *Cedrus deodara; P. californicus* from the Yosemite Valley, Cal., on *Pinus ponderosa; P. yosemite* from California and Washington on *Pinus ponderosa* and *P. lambertiana; P. webbi* from Arizona and New Mexico on *Pinus strobiformis, P. scopulorum*, and *P. murrayana (contorta); P. radiatae* from California and Washington on *Pinus radiata* and *P. sylvestris; P. fiskei* from New Hampshire on *Picea rubens* and *P. mariana; P. nigræ* from New Hampshire on *Picea mariana; P. puncticollis* from West Virginia on *Picea rubens; P. murrayanæ* from Oregon on *Pinus murrayana; P. coloradensis* from South Dakota and central Colorado on *Picea canadensis* and probably on *P. engelmanni; P. alascensis* from Alaska probably on Picea; *P. burkei* from Utah and Colorado on *Abies lasiocarpa; P. piperi* from Washington, Idaho, and British Columbia on *Abies lasiocarpa* and *A. concolor; P. fraseri* from North Carolina on *Abies fraseri;* and *P. curriei* from British Columbia, the host unknown, probably Pinus. The other 7 species recognized as occurring in North America are: *P. strobi, P. nemorensis, P. fasciatus, P. costatus, P. rotundatus, P. dubius,* and *P. affinis.*

The work concludes with a bibliography of 67 titles.

Hosts of Strepsiptera, C. ROBERTSON (*Canad. Ent., 42 (1910), No. 10, pp. 323–330*).—The author presents a list of 36 species of Hymenoptera which he has found to serve as hosts of Strepsiptera.

Bees, R. ROBERTSON (*Canada Expt. Farms Rpts. 1910, p. 331*).—In wintering experiments it was found that dysentery occurred in the hives of 3 colonies that wintered on their sealed stores, though there was but very little and in but one of 3 colonies that wintered on a sugar sirup made of granulated sugar and water 2:1 by weight, the water being first boiled and the sugar then stirred in. It is stated that the practice of placing colonies in cellars late in the fall, removing the covers and quilts from the hives, then placing 3 empty grain bags over each and raising the bodies from the bottom boards at their entrance with 2 in. blocks has given such good results that it is being generally adopted in Nova Scotia. This practice allows of such good ventilation that mildew never appears on the frames.

Aphelinus diaspidis, H. J. QUAYLE (*Jour. Econ. Ent., 3 (1910), No. 5, pp. 398–401*).—This article deals with the life history and bionomics of *A. diaspidis*, the only parasite of the red or orange scale (*Chrysomphalus aurantii*) of economic importance in California.

"The duration of the egg stage is from 4 to 5 days, of the larval stage 12 to 16 days, and of the pupal stage 8 to 10 days. The adult, under nearly normal conditions, usually died in 4 or 5 days." It has been found that this species may reproduce parthenogenetically.

New parasites of the genus Meraporus, E. S. TUCKER (*Canad. Ent., 42 (1910), No. 10, pp. 341–346*).—Three parasites are here described as new, namely, *M. utibilis*, collected in seed wheat, corn, and oats at Plano, Tex., containing *Calandra oryzæ*, and also bred from an ear of corn infested by *C. oryzæ*, collected in a field near Shreveport, La.; *M. vandinei*, bred from rice infested by *C. oryzæ*, collected at Welsh and Lake Arthur, La., and Plano and El Campo, Tex.; and *M. requisitus*, bred with *M. vandinei* from the material collected at Welsh, La.

Life history notes and control of the common orchard mites Tetranychus bimaculatus and Bryobia pratensis, G. P. WELDON (*Jour. Econ. Ent., 3 (1910), No. 5, pp. 430–434*).—The hibernation of, summer habits, and control measures for these species are described. See also a previous note (E. S. R., 23, p. 264).

Spraying, W. T. MACOUN (*Canada Expt. Farms Rpts. 1910, pp. 150–154*).—In experiments conducted during the spring of 1909 a commercial brand of lime-sulphur, diluted with water 1:11, did not destroy the eggs of the apple aphis. Results obtained from spraying nursery stock with two commercial insecticides, whale-oil soap and kerosene emulsion, are briefly noted.

In experiments conducted for the purpose of comparing Paris green with arsenate of lead and to show what quantity of the latter is the most economical to use in combating the Colorado potato beetle, 1 lb. of Paris green to 40 gal. of water gave quite satisfactory results. Eight oz. of Paris green to 40 gal. of water did not prove so effective; but 3 lbs. of arsenate of lead was more effective, and 2 lbs. of arsenate of lead as effective, as the 1 lb. of Paris green. A formula of 8 oz. Paris green and 1½ lbs. arsenate of lead to 40 gal. water gave as good results as any. Arsenite of lime formulas were also effective, but 3 applications were necessary in order to control the larvæ. In a second experiment, where a different brand of arsenate of lead was used and other formulas tried, it was found that 2 lbs. of arsenate of lead to 40 gal. of water was quite effective, though slightly better results were obtained with larger quantities. The results obtained from arsenite of lime formulas were not as satisfactory as were those where 1 lb. of Paris green, or 2 lbs. or more of arsenate of lead, was used. It would appear from these trials that the best formulas are arsenate of lead, from 2 to 3 lbs. to 40 gal. of water; Paris green, 1 lb. to 40 gal. of water; and Paris green 8 oz., with arsenate of lead 1½ lbs. to 40 gal. water. It is thought that Paris green and arsenate of lead applied together will give better results on the whole than the 2 applied separately.

Spraying machinery, W. H. Goodwin (*Ohio Sta. Bul. 216, pp. 491–526, figs. 27*).—This bulletin discusses the various factors to be considered in choosing a spray pump. A list is given of the manufacturers who make various kinds of spraying machines. Tabular descriptions of these machines follow, giving the capacity, as estimated by the companies and by using the actual amount of liquid displaced per minute by the plunger, the type of valves used in the pump, the length of stroke and diameter of the cylinders, and additional remarks upon the various types.

Fumigation box materials, W. E. Hinds (*Jour. Econ. Ent., 3 (1910), No. 5, pp. 394–398, pl. 1*).—Tests made of the comparative porosity of 37 samples of fumigation materials are reported.

The results show that in the construction of fumigation boxes it is best to depend for gas tightness upon heavy paper with the edges or overlappings securely sealed by glue rather than upon the quality of lumber, the tightness of the joints, or a finishing coat. With hydrocyanic gas there is less difficulty because of its lack of the solvent power possessed by carbon disulphid.

FOODS—HUMAN NUTRITION.

Principles and practice of ice cream making, R. M. Washburn (*Vermont Sta. Bul. 155, pp. 92, dgm. 1*).—The importance of the ice cream industry in the United States and the possible value of this industry in Vermont are discussed, a large amount of information on the classification of ice creams and other similar topics is presented, and the results are reported of studies of ice cream making, particularly under factory conditions.

Quotations from the author's summary follow:

"There are two general classes of ice cream recognized; the plain (raw), and the French (cooked custard).

"The flavor is influenced by the fat content of the cream; by its freedom from contamination of all sorts; by a low cream acidity; by the addition of minute quantities of common salt; and by the ripening or aging of the ice cream. A good body is the result of the presence of plenty of fat, but not too much; of the aging and thorough cooling of the cream; and, sometimes, of the use of fillers. A fine texture is promoted by the richness of the cream; by the proper conduct of the freezing process; by the aging of the cream; and, if the goods are not to be used promptly, by the use of a gelatinoid binder. Swell (or overrun) is caused by the incorporation of air into the cream, and is affected by the viscosity of the cream; by the rate of freezing; and particularly by the length of time elapsing while the cream is dropping from 34 to 29° F.; and by the speed of the agitating mechanism. The richness or leanness of the cream within working limits has but little effect thereon; neither does the use of gelatin, gum tragacanth or other binders. The time element in the conduct of the process depends upon the initial temperature of the cream; upon the rate of flow of and the temperature of the brine or upon the proportions of salt and ice used; upon the fineness or coarseness of the fragments of ice and the particles of salt; and upon the amount of sugar used in the cream.

"Its flavor, fat content, warmth or coldness, acidity, the method of handling (separation, pasteurization, homogenization, etc.); all these have effect upon the final product. A clean cream is of course essential. Neither a very rich nor a too thin cream should be used, about 22 per cent fat seeming ideal. . . .

"A filler is used to give body; a binder to prevent coarse crystallization when held for one day or longer. Starch, flour, eggs and rennet are used as fillers with greater or less satisfaction, generally less. Gelatin, gum tragacanth, and ice cream powders are used as binders often with good satisfaction; but their use, though legal in Vermont, is forbidden in several States. There appear to be arguments on both sides of the question as to the advisability of the use of binders in commercial cream. The adverse arguments are that inferiority and age are thus concealed, the swell unduly augmented, the use of low-grade materials encouraged, insanitary holding conditions favored and adequate food control rendered difficult. Those advanced in favor of their use are that they prevent granulation and consequent deterioration, discourage the return and reusage of unsold goods, and assist trade regulations. . . .

"The reasons for, the necessity of, and the directions for modifying and standardizing of creams used for ice cream making are described and examples of the calculations given, together with tabulated matter pertinent thereto; a scheme for the simple testing of the butter fat content of ice cream is explained; a score card for ice cream judging is suggested; the method of calculating ice cream yields is reviewed; the equipment necessary for one to enter upon commercial ice cream making on a moderate scale is indicated; the profits of the industry as compared with butter making are shown; a few unsolved problems are briefed; references are made to literature which will prove helpful to operators; the scant bibliography is listed; and the bulletin is closed with an index."

A number of formulas for ice cream making are presented.

Ice cream, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 218, pp. 15*).—Of 125 samples examined 88 were reported up to standard with respect to the amount of fat required, namely, 14 per cent. The author states that there has been a very marked improvement in the quality of Canadian ice cream during the past 2 years.

[The examination of butter and other food products and miscellaneous food topics], J. Foust (*Penn. Dept. Agr., Mo. Bul. Dairy and Food Div., 8 (1910), Nos. 4, pp. 87; 6, pp. 77*).—The results of the examination of a large number of samples of dairy products and miscellaneous food products are reported, together with an account of suits and prosecutions and a list of licenses issued. Butter versus oleomargarine is one of the miscellaneous food topics discussed.

[Miscellaneous food topics], E. W. Burke (*Ann. Rpt. Dairy, Food and Oil Comr. Wyo., 6 (1910), pp. 72*).—Data are given regarding the inspection of foods, drugs, and oils, and miscellaneous information summarized concerning a number of pure food topics. Of 495 samples examined 399 were passed, 93 were not passed, and 3 were declared illegal.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 692–693, p. 1 each; 694, pp. 2; 695, p. 1; 696, pp. 2; 697, pp. 11; 698–699, pp. 2 each; 700, pp. 12; 701, p. 1; 702, pp. 2; 703, pp. 3; 704–705, pp. 2 each; 706, p. 1; 707, pp. 3; 708–709, pp. 2 each*).—These notices of judgment have to do with the misbranding of vanilla extract, drug products and cheeses; the adulteration of biscuits, canned pineapples, and olive oil; the adulteration and misbranding of strawberry jam and quince jam, corn sirup and sorghum compound, peach preserves, blackberry preserves, apple butter, and preserves; and the alleged misbranding of drug products.

[Meat and fish goods], P. KICKELHAHN (*Jahrb. Deut. Landw. Gesell., 25 (1910), No. 3, pp. 594–605*).—A summary of data regarding the examination of a number of samples of canned goods and other preserved meat and fish products.

Concerning the policy followed in the inspection of meat in German cities, H. GERLICH (*Arch. Deut. Landw. Rats, 34 (1910), pp. 130–212*).—A large amount of statistical and other data are summarized and discussed.

Note on the setting of gelatin, OLIVE G. PATTERSON and CLARA C. BENSON (*Jour. Home Econ., 2 (1910), No. 6, pp. 656, 657*).—According to the authors' experiments, which are briefly summarized, gelatin may be freed of its mineral matter and tyrosin-holding impurities without affecting the gelatinizing power of its solutions. The effect of boiling on gelatin solutions was also tested and it was found that while boiling for 1 hour did not prevent gelatinization long-continued boiling diminished it. With respect to the effect of citric and acetic acids, it was found that 4 per cent gelatin solutions containing citric acid to a concentration of 1 per cent would gelatinize in the cold after 15 minutes' boiling, but that after 10 minutes' boiling of a 3 per cent solution with 0.5 per cent citric acid the gelatinizing power had considerably decreased.

In the authors' opinion more work is needed before definite deductions can be drawn.

Microscopical study of cereal foods, W. H. KENDELL (*Midland Druggist and Pharm. Rev., 44 (1910), No. 7, pp. 419–422; abs. in Chem. Zentbl., 1910, II, No. 17, pp. 1322*).—The results of an extended microscopical study are reported of the starch and cell tissue of breakfast foods made from wheat, corn, oats, rice, and barley.

Iroquois uses of maize and other food plants, A. C. PARKER (*N. Y. State Mus. Bul. 144, pp. 119, pls. 31, figs. 23*).—A large amount of data is summarized regarding the preparation and uses by the Iroquois Indians of Indian corn and other food materials. A list of authorities quoted is appended.

The chemical composition of Kafir corn, I, R. O. BAIRD and C. K. FRANCIS (*Jour. Indus. and Engin. Chem., 2 (1910), No. 12, pp. 531–534, fig. 1*).—The results of a comparative study of Kafir corn and Indian corn are reported, particularly with reference to proximate composition, the composition of the nitrogen-free extract, the value of the two grains for producing alcohol, the character of the fat and ash constituents, and the draft of the two crops on the soil. According to the authors' summary, proximate analysis shows that Kafir corn compares favorably with Indian corn.

"Kafir corn is more uniform than corn in composition. It is a cheap food. Alcohol and glucose can be produced cheaper from Kafir corn than from corn if the cost of the raw material is alone considered. Kafir corn removes a smaller quantity of the important plant foods from the soil than corn. This fact has been shown by analyses of the ash of both grains which were grown under similar conditions. The fat from the Kafir kernel is a solid which melts at 44.2°. It should be valuable in the manufacture of soaps and fatty acid products."

Plantain meal in Dominican Republic, P. E. Holland (*Daily Cons. and Trade Rpts. [U. S.], 13 (1910), No. 147, p. 1153*).—A brief description is given of the manufacture and uses of plantain flour or meal together with data regarding the cost of manufacture.

Milling and baking tests, C. E. Saunders (*Canada Expt. Farms Rpts. 1910, pp. 167–170*).—Brief notes are recorded regarding tests carried on in continuation of earlier work (E. S. R., 22, p. 367).

From a comparison of new and standard varieties of spring wheat of the crop of 1909 it appears that several of the new cross-bred varieties produced stronger flour than any of the samples of Red Fife tested and that in several cases the color of the bread from cross-bred wheats is "remarkably good." "The propagation of these phenomenally promising wheats will be pushed as rapidly as possible. Most of them ripen very much earlier than Red Fife and give a good yield of hard, red kernels." Kubanka, the only durum wheat tested, showed a very high baking strength.

A study of the effects of storage on wheat and flours confirmed the results of earlier work as to its beneficial effect upon the color of flour and the baking strength, whether the material is kept as flour or as wheat. Under proper storage the author considers that both wheat and flour continue to improve for considerably more than a year.

Additional work also confirmed the conclusion that wheat may be subjected to a very considerable amount of dampness without causing the resulting flour to lose its baking strength, indeed sometimes a gain in strength was noted. "Some light was thrown on the cause of this gain by the discovery that the addition of a very small amount of malt flour to the flour made from the original sample of wheat (which had not been rendered damp) produced bread almost identical with that made from the damp wheat without the addition of malt. The addition of malt flour to the samples of flour made from the damp wheat produced little or no effect."

As regards the effect of fertilizers on flour strength, "no striking influence was observed from any form of fertilizer and . . . exhausted soil produced flour of unimpaired baking strength."

The artificial bleaching of flour was also studied. "In some instances, the bleached flours appeared to be very slightly stronger for bread making than the unbleached, and in others they appeared to be very slightly weaker, but the differences observed were all extremely slight and probably within the limits of unavoidable experimental error. Certainly the artificial bleaching, while giving to the flour a paler tint somewhat like that which is produced by natural bleaching, does not impart the increased strength which flour almost always obtains from prolonged storage under good conditions. On the other hand, it is equally clear that artificial bleaching properly carried out, as in the samples examined, does not appreciably injure the bread-making strength of the flour. Bleaching had no effect, so far as could be observed, on the flavor of the bread."

Bleached flour, F. T. Shutt (*Canada Expt. Farms Rpts. 1910, pp. 196–203*).—Flours bleached under the auspices of a station official were studied in comparison with unbleached flours. According to the author, in every instance the bleached flour was lighter in color and drier, the average difference in moisture content between bleached and unbleached flours being 0.66 per cent. The bleaching process was not found to affect the ash content or the fat content appreciably. "It was observed, however, that the extracted fat of the bleached flour was invariably paler than that of the corresponding untreated flour."

The analytical data did not show that bleaching had any influence on the nitrogen. "Throughout the series the results of each pair (bleached and unbleached) are extremely close, certainly the differences are such as might be ascribed to experimental error."

Determinations of wet and dry gluten "yielded nothing of diagnostic value, unless the paler color of the gluten from the bleached flour could be so considered. Not only were the amounts of wet and dry gluten appreciably the same for the unbleached and bleached samples of flour, but no differences could be discerned in their resiliency and elasticity."

Determinations of the nitrite nitrogen made within 3 weeks after the bleaching showed that 10 of the 11 samples of bleached flour examined contained less than 0.5 parts per million. No nitrite nitrogen was found in the samples of unbleached flour examined.

From tests with bread made from bleached and unbleached flour the conclusion was reached that "flour free from nitrite-reacting material baked in an electric oven will yield bread free from nitrites." If bread is made from flour containing considerable amounts of nitrite nitrogen, and similarly baked, it may or may not be free from nitrites, but in any case the amount will be very considerably reduced.

From the experimental data the author concludes that the moisture content of both bleached and unbleached flour when similarly exposed varies directly with the hygroscopic condition of the atmosphere. Since the bleached flour was found to be slightly drier and its absorptive capacity somewhat greater than that of the unbleached flour, the results reported "give some support to the contention that a slightly larger amount of bread could be obtained from the former."

Experiments were made on the bleaching effect of sunlight and of air, and according to the author, there seems no doubt that the air in the absence of direct sunlight exercises a bleaching influence. The examination of 2 samples of flour bleached by exposure to air and light showed that both samples contained nitrate nitrogen to the extent of 0.05 part per million.

Preserved vegetables, G. JAENSCH (*Jahrb. Deut. Landw. Gesell., 25 (1910), No. 3, pp. 605–607*).—Data are given regarding the examination of a number of samples of canned vegetables and other vegetable products.

The dietetic value of fruit, W. R. LAZENBY (*Trans. Mass. Hort. Soc., 1910, pt. 1, pp. 89–97*).—In connection with a summary of data on the food value of fruits and nuts the author states that he has found differences in the water content of underdeveloped and well developed fruits, less than 80 per cent being found in "nubbin" strawberries, "cull" peaches, and "runty" apples, as compared with 90 per cent in fine but not overgrown specimens of these fruits. He states, further, that 92 per cent of water was found in fine large peaches in comparison with 84 per cent in small peaches of the same variety.

Data are also recorded for a number of sorts of nuts, regarding the number of nuts in a pound, the percentage of shell or waste, and the percentage of kernel, and the cost of whole nuts and of the edible portion. "It was found during the course of the investigation that with the most careful cracking of some of the larger nuts, there is a 'milling' or cracking loss of nearly 2 per cent of the total weight of kernels."

Fruit products, BAIER (*Jahrb. Deut. Landw. Gesell., 25 (1910), No. 3, pp. 608–612*).—Data are given regarding the examination of a number of samples of jelly and other fruit products.

Marmalade, jelly and fruit pastes, F. HÄRTEL and J. SÖLLING (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 11, pp. 708–712*).—Analyses of commercial products are reported and discussed as a reference for standards which are proposed for such goods.

Grape, fruit, and berry wines.—Pastes and other products, F. von Canstein (*Jahrb. Deut. Landw. Gesell., 25 (1910), No. 3, pp. 612–616*).—Wines, macaroni, and other products were examined.

The nuclein content of foods, particularly those of East Indian origin, G. J. Jebbink (*Over het Nucleinengehalte van menschelyk voedsel en vooral van Indische Versnaperingen. Diss., 1910; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 5 (1910), No. 21, p. 829*).—Analyses of 60 foods and condiments are reported, the work being undertaken with special reference to the relation of organic phosphorus to beriberi.

Notes on the diet of professional athletes, T. Siebert (*Umschau, 14 (1910), No. 49, pp. 975, 976, fig. 1*).—The author records data concerning the food habits of several professional athletes. In his observations the quantity and character of the food varied very widely and he concludes that each man must select the food which suits his individual needs.

The feeding of school children, Helene Simon (*Die Schulspeisung. Leipsic, 1909, pp. VIII+93*).—Pioneer work in the systematic feeding of school children, the conditions which must be met, and other questions are discussed with reference to work in Germany and other countries.

The food of school children in Mannheim, Helene Simon (*Soz. Praxis, 20 (1910), No. 9, pp. 280, 281*).—Statistical and other data are given regarding the feeding of school children under municipal auspices.

Report of the penny lunch experiment in Boston, January 1 to June 30, 1910, Ellen H. Richards (*Jour. Home Econ., 2 (1910), No. 6, pp. 648–653*).—An account of the enterprise is given and suggestions made for future work.

A day's metabolism, Clara C. Benson et al. (*Jour. Home Econ., 2 (1910), No. 6, p. 658*).—The results are briefly reported of an experiment in which the nitrogen balance was determined with a subject on a mixed diet. The urine was collected at hour intervals.

The day's diet supplied 11.56 gm. nitrogen and 9.74 gm. was found in the urine and 1.38 gm. in the feces, which implies a gain of 0.44 gm. The total phosphorus excretion for 24 hours was 0.7 gm. and the sodium chlorid excretion 7.2 gm.

A comparison of the total nitrogen excretion of either kidney in normal individuals during varying periods of time, T. B. Barringer, Jr., and B. S. Barringer (*Amer. Jour. Physiol., 27 (1910), No. 1, pp. 119–121*).—A number of observations of the quantities excreted by each kidney are recorded. In one case the amounts were found to be equal. Six times they varied by less than 10 per cent and 4 times they varied from 10 to 20 per cent.

"As regards the total nitrogen, in one case the quantities were equal. In seven cases they varied by less than 1 gm. per liter. In two cases they varied by between 1 and 2 gm. per liter. The nitrogen-urea plus ammonia-urea showed in three cases a variation of less than 1 gm. per liter and in six cases a variation of between 1 and 2 gm."

The work of digestion in a carbohydrate diet in relation to the physical influence of food, O. Müller (*Biochem. Ztschr., 28 (1910), No. 5–6, pp. 427–455*).—Experiments were made with dogs and included studies of the respiratory quotient and related factors.

According to the author, the results indicate that when starch was taken the amount of energy liberated from the body was much greater than was the case with sugar. The observation that small amounts of food involved less work of the digestive organs than larger quantities in his opinion needs further study. In general, he concludes that his results with large quantities of starch and sugar show that on a starch diet 9.25 calories per 100 calories of digested material were produced during 8 hours in excess of the value for a fasting animal, and that the increase was only 5.61 calories per 100 calories in the case of grape sugar. The experiments are discussed at length in relation to the work of earlier investigators.

The transformation of the glycogen into glucose by the animal tissues, F. Maignon (*Ann. Soc. Agr. Sci. et Indus. Lyon, 1908, pp. 78–80*).—From laboratory experiments the author concludes that muscles possess an amylase which transforms glycogen into glucose. The transformation which takes place constantly under normal conditions is accelerated by certain influences such as crushing the tissue, which favors the intimate contact of the amylase and glycogen.

Fatigue poisons, W. Weichardt (*Über Ermüdungsstoffe. Stuttgart, 1910; rev. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 5 (1910), No. 22, p. 880*).—The author has summarized the results of his numerous investigations which led him to conclude that fatigue is due to the production of a specific toxin and that with this toxin an antitoxin may be prepared.

ANIMAL PRODUCTION.

The respiration calorimeter at the Institute of Animal Nutrition of the Pennsylvania State College, H. P. Armsby (*Pennsylvania Sta. Bul. 104, pp. 3–16*).—A previous description of the respiration calorimeter at the Pennsylvania Institute of Animal Nutrition (E. S. R., 15, p. 1037), which is used in coöperation with this Department for the direct determination of the heat production of cattle, is here substantially reprinted, with a discussion of check tests of the accuracy of the apparatus which have been made.

Two groups of alcohol check tests are reported, the first including those made with the original form of the apparatus in which a considerable portion of the moisture of the outgoing air was condensed in copper freezing cans, and the second including tests of the present apparatus.

"Apparently the most serious error in the heat determinations lies in the measurement of the water vapor given off, and the more accurate determination of the latter by means of the aspirator samples reduces the average error to a very small amount, although it does not seem to materially reduce the range of the single results. The removal of the copper freezing cans appears not to have affected the average accuracy of the determinations. . . . The excess of water vapor found in the samples taken by the meter pump seems to be due to a drying out of the sampling pans and especially of their rubber covers during the earlier hours of the experiment."

"The results of a single experiment with the respiration calorimeter may be regarded as accurate to within approximately the following percentages of the total amounts determined: Carbon dioxid 0.5 per cent, water (in aspirator samples) 6 per cent, heat 1 per cent."

Influence of type and of age upon the utilization of feed by cattle, H. P. Armsby and J. A. Fries (*Pennsylvania Sta. Bul. 105, pp. 3–22, figs. 6*).—An investigation with the respiration calorimeter at the Pennsylvania Institute of Animal Nutrition of the relative efficiency of different types of animals as converters of the energy of waste products into forms suitable for human food.

To compare the beef type with the scrub as a meat producer a pure-bred Aberdeen-Angus steer 8½ months of age, and a steer 11 months old, of the dairy type, containing a large percentage of Jersey blood, were under observation over 2½ years. Both animals received similar rations, which consisted of hay, bran, and mixed grains; the live weight was frequently taken, and the digestibility of the total ration and the nitrogen balance were determined at intervals. As regards the average percentage digestibility of the total dry matter, and protein, and the availability of the total energy, in both hay and grain, there was no evidence of the possession of any higher digestive power by the pure-bred animal over that of the scrub.

In a comparison made in 1905 of 2 periods in which different amounts of timothy hay were given 60.51 per cent in the case of the pure-bred steer and 55.21 per cent in the case of the scrub steer of the additional metabolizable energy supplied in the larger ration was substituted for the energy previously derived from the katabolism of the body substance, the remainder being disposed of by an increase in the heat production of the steer. The results of 1906 and 1907 as a whole also seemed to indicate a small but a distinct superiority of the pure bred over the scrub steer as regards the availability of the metabolizable energy of the feed. The difference appeared to be more marked in the earlier years, as the scrub nearly or quite overtook the pure-bred steer in this respect as they reached maturity.

The growth of the pure-bred steer was more largely in body girth, while the scrub steer increased relatively more rapidly in length and height, or, in other words, the pure-bred steer showed a tendency to fatten, while the scrub inclined to gain relatively more nitrogenous material. "The difference in availability may conceivably be related to the apparent difference in the nature of the gains or losses.

"As regards any influence of age upon the percentage availability of the feed, the results appear indecisive. In the case of the hay (aside from the questionable results of 1906), the differences are very small and in opposite directions with the two animals. In the case of the mixed grain of 1906 and 1907, there is apparently a tendency to a somewhat greater availability by the older animals. On the whole, the results as regards the influence of age afford little support to the belief in a greater ability of young animals to utilize the metabolizable energy of their feed."

"The experiments of 1907, the results of which were the most satisfactory, show a marked difference between the two animals as regards the maintenance requirement, that of the scrub steer being 33.7 per cent higher than that of the pure-bred steer. The results obtained in 1905 and 1906 have less weight, but nevertheless they show a difference in the same general direction. On the average of the 3 years' experiments the available energy required for maintenance per 500 kg. live weight was: Pure-bred steer 5,971 calories, scrub steer 7,090 calories."

It is thought that the difference in temperament explained in large part the economic superiority of the beef type. From October 1, 1904, to December 4, 1906, the pure-bred steer made an average daily gain of 0.426 kg. and required 13.68 kg. of air-dry matter for each kilogram of gain. During the same period the scrub steer made an average daily gain of 0.422 kg. and required 13.37 kg. of air-dry matter in the feed eaten to produce a kilogram of gain, so that the scrub steer produced a unit of gain in live weight upon somewhat less total feed than did the pure-bred steer. The pure-bred steer was superior to the scrub, however, as regards the energy content of the unit of gain.

"That a unit of gain by the pure-bred steer represented the storage of more energy than an equal gain by the scrub steer appears to be due largely to the greater proportion of protein with its large amount of accompanying water which seems to have characterized the gain made by the latter. Both the composition of the gain observed in the respiration calorimeter experiments and the results of the nitrogen balance trials show that the scrub steer had a notably greater tendency than the pure-bred steer to gain protein, while the pure bred, on the other hand, was inclined to store up more fat. This result was confirmed also by chemical analyses of corresponding parts of the carcasses of the animals at the close of the experiments.

"Our general conclusion from the foregoing data, then, is that the two steers did not materially differ as regards digestive power, percentage of feed energy metabolized, or percentage availability of the feed energy. The pure-bred steer was superior to the scrub in that his maintenance requirement was less while his capacity to consume feed was greater. On the moderate rations fed, he manifested this superiority, however, not in the form of greater gain of live weight from a unit of feed, but in the production of higher quality of product, representing the storage of more energy available as human food."

The rate of gain outside of the respiration calorimeter experiments on limited rations was fully as great as that predicted by Kellner for similar animals, and it would be very satisfactory in practice for animals not being fattened. It is considered that for simple growth without material fattening, the results indicate that Kellner's standards as regards available energy might be somewhat reduced.

"As regards the protein requirements, we find a striking contrast between our rations and the accepted standards. Our two steers made entirely satisfactory gains on rations whose digestible protein ranged in the case of the scrub steer from 70 to 95 per cent of the formulated requirements of the dairy breeds, and in the case of the pure-bred steer from 50 to 70 per cent of those of the beef breeds. The difference is greatest at the earliest ages and gradually diminishes."

"The tendency of recent investigations, however, is to show that in all branches of feeding the minimum protein requirement has been considerably exaggerated. This has been shown to be true of the maintenance requirement and of the requirement for milk production, while our results suggest that it is also true for growth. At any rate this branch of the subject seems worthy of further investigation."

Commercial feeding stuffs.—Principles and practice of stock feeding, J. L. Hills, C. H. Jones, and P. A. Benedict (*Vermont Sta. Bul. 152, pp. 515–614*).—Analyses are reported of cotton-seed meal, linseed meal, ground flax flakes, distillers' dried grains, gluten feed, molasses feed, hominy feed, oat feeds, wheat by-products, red dog flour, provender, corn meal, rye products, ground oats, and proprietary mixed feeds. The remainder of the bulletin is a popular presentation of the principles and practice of stock feeding, and is in large part a revision of Bulletin 81 (E. S. R., 12, p. 877).

The relative value of field roots, F. T. Shutt (*Canada Expt. Farms Rpts. 1910, pp. 208–213*).—Chemical analyses of different varieties of mangels, turnips, carrots, and sugar beets grown in 1909 are reported.

The mangels varied in dry matter from 8.94 to 12.66 per cent, and in sugar content from 4.47 to 7.56 per cent. These results are in accord with previous findings and demonstrate the advisability of considering the composition as well as the yield and keeping quality in the selection of a variety for feeding purposes. The same varieties have maintained practically their relative positions for 10 consecutive seasons, which supports the view that heredity plays an important part in determining the composition of the root.

The sugar content in turnips varied from 0.99 to 1.79 per cent. The dry matter was about the same as in mangels. The sugar content of carrots varied from 1.38 to 3.36 per cent. The seasonal influence for the past 5 years affected the carrots much less than the other roots.

The feeding value of mangels, T. B. Wood (*Jour. Agr. Sci., 3 (1910), No. 3, pp. 225–232*).—Three varieties of mangels were compared in a series of 12 cattle feeding tests. The basal ration consisted of grain, hay, and straw. The gains made corresponded very closely with the relative percentages of dry matter in the roots.

[Experiments with alfalfa hay and alfalfa silage], S. C. Dinsmore (*Nevada Sta. Bul. 72, pp. 37–40*).—In digestion experiments with sheep the average digestion coefficients were as follows: Alfalfa hay, dry matter 57.93, protein 61.77, fat 40.07, fiber 54.06, nitrogen-free extract 67.75, and ash 35.68 per cent; alfalfa silage, dry matter 46.55, protein 54.63, fat 79.80, fiber 39.16, nitrogen-free extract 42.92, and ash 44.87 per cent.

Wine-residue molasses, O. Fallada (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw., 39 (1910), No. 3, pp. 407–410*).—Chemical analyses are reported of a feed composed of a mixture of molasses and the residue from the wine press.

Calcium carbonate for the preservation of molasses feeds, O. von Czadek (*Ztschr. Landw. Versuchsw. Österr., 13 (1910), No. 6, pp. 591–596*).—A series of tests to determine the effect on the keeping quality of molasses feeds of adding calcium carbonate.

The results show that feed thus treated lost in feeding value, that the conserving effect of calcium carbonate is very slight, and that with controls kept for 8 months there was no apparent advantage over the usual method of storage in thus treating the feed.

Results of the feed inspection for 1910, B. E. Curry and T. O. Smith (*New Hampshire Sta. Bul. 149, pp. 10*).—Analyses are reported of alfalfa meal, hominy feed, cotton-seed meal, brewers and distillers' grains, gluten feeds, molasses feeds, beef scrap, poultry, and miscellaneous feeds. The present state law to protect the consumers of commercial feeding stuffs is characterized as inadequate.

Uniform commercial feeding stuffs law (*Amer. Hay, Flour, and Feed Jour., 18 (1910), No. 1, pp. 26, 27*).—This is the draft of a proposed uniform feeding stuff law which was adopted by the Association of Feed Control Officials, November, 1910.

[Feeding experiments in 1909], J. H. Grisdale, R. Robertson, J. Murray, A. Mackay, and G. H. Hutton (*Canada Expt. Farms Rpts. 1910, pp. 62, 63, 79–103, 329, 330, 367–371, 419, 420, 488, 489, pl. 1*).—In a horse feeding test it was found that corn and bran 5 : 2 or barley and bran 5 : 2 could be substituted for oats and bran in the same proportions, although both the corn and barley were less palatable than the oat ration.

Three lots of lambs were fed a basal ration of "nutted oil cake," bran, oats, and hay. With turnips as a supplementary feed the gain per head and day was 0.244 lb., at a cost of 10 cts. per pound; with ensilage as a supplementary feed the corresponding gain was 0.244 lb., at a cost of 9 cts. per pound; with both turnips and ensilage the gain was 0.21 lb. per head and day, at a cost of 10.9 cts.

In swine feeding tests the cost per pound of gain on a ration of shorts, ground oats, feed flour, bran, roots, and skim milk was less than on a ration of corn and barley. Preliminary notes are given of an experiment in the ventilation of piggeries. Pork production was cheaper when wintering swine in the open than when confined in pens. The open lots, however, were provided with cabins for sleeping.

Seven short fed 2-year-old steers in 117 days made an average daily gain per steer of 2.12 lbs., at a cost of 6.33 cts. per pound. Three "carried over" steers in 290 days made an average daily gain per head of 1.32 lbs., at a cost of 11.68 cts. per pound. Three long fed steers in 990 days made an average daily gain per head of 1.2 lbs., at a cost of 7.1 cts. per pound. Five baby beef steers in 580 days made an average daily gain per head of 1.62 lbs., at a cost of 5.21 cts. per pound. Nine steer calves in 282 days made an average daily gain of 1.41 lbs., at a cost of 4.4 cts. per pound.

At the Nappan Farm, Nova Scotia, 53 steers in 165 days made an average daily gain of 1.46 lbs. per head, at a cost of 9.9 cts. per pound. At the Brandon, Manitoba, Farm, cheaper and faster gains were made when the steers were provided with shelter than when kept in the open. At the Indian Head Farm, Saskatchewan, 2-year-olds were found to return a smaller net profit per head than 3-year-olds. At the Lacombe, Alberta, Farm, 18 steers in 109 days made an average daily gain of 1.72 lbs., at a cost of 7.42 cts. per pound.

Cattle production in Belgium, A. GRÉGOIRE (*Rev. Écon. Internat.*, *7* (*1910*), *IV*, *No. 2*, *pp. 376–393*).—A discussion of the factors which have influenced the gradual increase in the number of cattle in Belgium from 1,203,891 in 1846 to 1,861,412 in 1908.

Cattle survey of the Amritsar district, G. K. WALKER (*Lahore: Govt., 1910, pp. V+42*).—A report on the live stock of the Amritsar district and their diseases.

The Amritsar district lies in the eastern portion of the Punjab between the Ravi and Beas rivers. The land, which is level and of alluvial origin, is held mostly by peasant proprietors. It is of less importance as a cattle district than formerly because of the irrigation projects which have destroyed the pastures previously used for grazing. The year 1908–9 was especially disastrous as many cattle, sheep, and goats died of starvation or succumbed to "gillar."

Working oxen, bulls, and cows, J. WRIGHTSON (*Live Stock Jour.* [*London*], *72* (*1910*), *No. 1911*, *pp. 535, 536*).—The author believes that conditions have so changed that many English farmers should return to the use of ox labor. Arguments are presented in favor of using bulls as draft animals, and it is argued that there are small farmers who can use cows for the same purpose, as is done more or less in France and other European countries.

Working oxen v. present condition of live stock industry (*Live Stock Jour.* [*London*], *72* (*1910*), *No. 1912*, *p. 562*).—In opposition to the views noted above, the ground is taken that it is more economical to hasten the maturity of beef cattle and to increase heavy milk production than to produce animals for draft purposes.

Microscopical investigations of the wool of caracul and zackel sheep, P. KERESZTURI (*Kisérlet, Közlem.*, *13* (*1910*), *No. 3*, *pp. 307–330*, *figs. 8*).—These are studies of the length and diameter of the wool hairs and the size and shape of the scales which compose the cuticular layer of the hair.

Report of horse breeding investigation, J. O. WILLIAMS (*Colorado Sta. Rpt. 1909, pp. 50–59*).—A report of progress of the work conducted by the station in cooperation with this Department. The percentage of foals obtained during the year was 75.9 per cent of the number of mares bred. Twenty-one animals of inferior quality were disposed of, which left 60 individuals of superior breeding stock. See also a previous note (E. S. R., 24, p. 271.)

The Government and Morgan horses, C. W. GAY (*Ohio Farmer*, *126* (*1910*), *No. 25*, *pp. 3, 6*, *figs. 4*).—An account of the efforts of the United States Department of Agriculture to put Morgan breeding on a practical basis. The changes in type over the old-fashioned Morgan now found among Morgan breeds are noted, and it is suggested that there is danger of losing some of the characteristics for which the Morgan is famous if breeders attempt to increase the size.

Notes on equitation and horse training (*U. S. War Dept. Doc. 375, 1910, pp. 98*).—These notes, which are used at the School of Application for Cavalry at Saumur, France, are here translated for the use of the regular army and organized militia of the United States. Besides notes on practical methods of riding and training a horse, there is a brief history of equitation and of the cavalry schools in Europe.

The horse as a motor, J. B. DAVIDSON (*Farmer, 28 (1910), No. 49, p. 1417, figs. 2*).—A discussion of the proper angle of the trace and other principles involved when the horse is used as a draft animal.

[Poultry work and experiments in 1909], A. G. GILBERT (*Canada Expt. Farms Rpts. 1910, pp. 293–305*).—Routine methods of feeding and handling fowls at the station poultry plant are given. As in previous years, there was a larger egg production in the unheated houses than in the houses supplied with artificial heat. During the 4 years that the trap nests have been used the annual egg production has been steadily increased by selection. Experiments in hatching chicks in incubators by means of heat obtained from the electric wires used for lighting the poultry plant were successful.

Comparison of warm v. cold houses as regards egg production, H. L. KEMPSTER (*Rpt. Mich. Acad. Sci., 12 (1910), pp. 85, 86*).—Three flocks of 70 hens each of the white Leghorn breed were kept in houses 14 by 24 ft. The number of eggs laid in the different houses was, during the first year from November to April, in a house double-walled throughout and with 4 in. air space, 2,850 eggs; in a house double-walled only on the north and east sides, 3,128 eggs; and in a single-boarded house, 3,022 eggs. In the second year, from December to March, in the house double-walled on all sides, the yield was 2,540 eggs; in the house double-walled on 2 sides, 2,379 eggs; and in the single-boarded house, 2,334 eggs.

"There is not enough difference in the 3 houses to permit the justification of a double-walled house. Beyond the supply of comfort to the birds, additional expense in the way of double walls is unnecessary. A poultry house should be dry, free from drafts, and well lighted and ventilated. When we have secured these conditions other factors must be taken into consideration when it comes to egg production."

Egg-laying competitions at Hawkesbury Agricultural College and Experiment Farm, Richmond, New South Wales, D. S. THOMPSON (*Dept. Agr. N. S. Wales, Farmers' Bul. 44, pp. 31, figs. 42*).—This bulletin contains data on the egg-laying competition for 8 years, and has been noted from other sources.

The Wyandottes, edited by J. H. DREVENSTEDT (*Quincy, Ill., and Buffalo, N. Y., 1910, pp. 160, pls. 3, figs. 176*).—This contains articles by different authors on the history of the Wyandotte breed, standard and nonstandard varieties of Wyandottes, utility values of the breed, judging and breeding Wyandottes, and related topics.

Conference of poultry farmers, C. POTTS ET AL. (*Dept. Agr. N. S. Wales, Farmers' Bul. 39, pp. 32*).—This consists of lectures delivered at the first poultry conference held at the Hawkesbury Agricultural College, 1909, on the topics of Electric Incubators and Brooders, The "Pros and Cons" of Continuous Hatching, Foods and Feeding, Profitable Duck Keeping, The Cold Storage of Eggs, and Ventilation of Incubators.

[Literature on animal industry for 1909], M. MÜLLER (*Jahresber. Landw., 24 (1909), pp. 221–266, 288–375*).—This contains brief reviews of leading articles which appeared in the German language during the year on the breeding, feeding, and care of horses, cattle, sheep, goats, swine, small mammals, poultry, and fish.

Annual review of investigations in general biology, edited by Y. DELAGE (*Ann. Biol. [Paris], 12 (1907), pp XV+571*).—This volume contains abstracts of important articles published during the year 1907 relating to cellular biology, variation, heredity, evolution, biological theories, and related topics.

The method and arrangement of biological studies, S. TSCHULOK (*Das System der Biologie in Forschung und Lehre. Eine Historisch-Kritische Studie. Jena, 1910, pp. 409; rev. in Zentbl. Allg. u. Expt. Biol., 1 (1910), No. 15–16, pp. 519–523; Arch. Rassen u. Gesell. Biol., 7 (1910), No. 6, pp. 750, 751*).—This work, which is a historical and critical study of biology, outlines the historical phases through which the botanical and zoological studies have passed. These periods have been characterized by the methods of study prevailing at the time, rather than as descriptive, historical, observational, comparative, and experimental. The author makes 7 groups of biological problems, as follows: Taxonomy, division of organisms in the groups; morphology, conformity to type; physiology, life processes of the organism; ecology, adaptation to environment; chorology, distribution in space; chronology, distribution in time; and genetics, origin of organic groups.

The cultivation of tissues of the chick embryo outside the body, M. T. BURROWS (*Jour. Amer. Med. Assoc., 55 (1910), No. 24, pp. 2057, 2058*).—Following the method which Harrison employed with frogs, the author isolated neural tubes, heart myotomes, and skin taken from 60-hour-old chick embryos and cultivated them in blood plasma obtained from healthy adult chickens under ether anesthesia.

The method practiced was to place the isolated fragments of tissue in a drop of the uncoagulated plasma on a cover glass, which was then inverted and sealed to a hollow slide and incubated at 39° C. The plasma immediately coagulated about the tissue and held the fragment firmly fixed. So prepared the specimen can be readily observed at all times under the microscope.

The success of the method depends on maintaining absolute asepsis and preventing undue chilling of the embryos or the completed specimens either during preparation or the later observations. The plasma is obtained by exposing the carotid artery and inserting a cannula previously sterilized in olive oil. The blood is collected in sterilized, paraffin-coated tubes, which are cooled immediately by being plunged into an ice-salt bath. The blood is then centrifugalized by placing the tubes in larger centrifuge tubes which contain a mixture of salt and ice. The supernatant plasma is removed by means of paraffin-coated pipettes and transferred to paraffin-coated receptacles, which are kept in a refrigerator until used.

The most actively growing elements in the preparations were the interstitial connective tissue cells, which spread into the plasma either as single cells or a layer of cells between the second and twelfth hours of incubation, as a rule, the growth continuing for from 6 to 14 days. The muscular elements grew much less frequently and cellular outgrowths from them were observed in only about 3 per cent of the experiments. The outgrowths take place from the myotomes of the heart in the form of short chains of striated cells. The outgrowth from the nerve cells consists of long axis-cylinder processes, which present the same morphological appearances and react in the same way to specific nerve stains as those of the chick embryo.

Further data regarding the sex-limited inheritance of the barred color pattern in poultry, R. PEARL and F. M. SURFACE (*Science, n. ser., 32 (1910), No. 833, pp. 870–874*).—A record is given of results obtained in the F_2 generation of crosses between Barred Plymouth Rock and Cornish Indian Game fowls, in continuation of earlier work (E. S. R., 23, pp. 674, 778). In all 670 adult F_2 chicks were recorded, from all possible matings inter se and with apparently pure breeds. In all cases the results agree closely with the Mendelian hypothesis of sex-limited inheritance.

"No one familiar with good specimens of that breed could ever mistake a barred F_1 bird for a pure Rock. In certain of the F_2 birds this is not the case. Certain of the F_2 matings produced birds which had a much finer, sharper and cleaner cut barred pattern, or, to adopt a technical expression a 'snappier' barring than any pure Barred Rock in the station stock. In other words, it appears that though the heterozygous nature of the F_1 birds was apparent in their external characters, the segregation of barred pattern in the F_2 generation was not merely perfect, but, to speak paradoxically, was more than perfect, i. e., produced something better than existed in the parent stock. It may be said, in passing, that the same thing is true with reference to comb types. In the F_1 generation there were very few perfect pea combs, from the fancier's standpoint. In the F_2 generation where pea combs segregated out relatively many of them were of fine show room quality, and relatively few were badly defective or intermediate between pea and single. . . . One further point needs mentioning. In the F_1 generation the male birds produced by the cross of B.P.R.♂×C.I.G.♀ and its reciprocal were all alike in gametic formula and external appearance. The F_2 results indicate that the same results were obtained with F_1 males from the cross B.P.R.♂×C.I.G.♀ as with those obtained from the cross C.I.G.♂×B.P.R.♀. These two kinds of males were, in other words, equivalent in fact as well as in theory."

On a modified Mendelian ratio among yellow mice, W. E. Castle and C. C. Little (*Science, n. ser., 32 (1910), No. 833, pp. 868–870*).—The authors present evidence in support of the view that homozygous yellow mice do not occur, because the yellow egg which by chance has met a yellow sperm has its career ended thereby and is not, therefore, capable of fertilization by a nonyellow spermatozoon.

The authors crossed yellow mice inter se, and of 1,235 young produced 800 were yellow and 435 nonyellow, which is explained as being within the limits of error. When mated inter se smaller litters were obtained than when yellows were mated with nonyellows, there being in 1,305 young from those mated inter se an average number per litter of 4.71, whereas in 325 litters obtained from yellow mated with nonyellows the average number per litter was 5.57. This difference is not so great as would be expected if homozygous yellow zygotes perished without otherwise affecting the character of the litter, hence, the authors conclude that the perishing of a pure yellow zygote makes possible the development of a certain number of other fertilized eggs. This may be either by the liberation of more eggs normally at an ovulation than there are young born subsequently, or the production of a relatively small number of young at one birth may lead indirectly to more free ovulation subsequently. Selective fertilization of the egg does not appear to occur in this case.

These results, wherein a Mendelian class may be formed and afterwards lost by failure to develop, seem to be comparable to those obtained by Baur with the genus Antirrhinum in plants.

The effect of one-sided ovariotomy on the sex of the offspring, L. Doncaster and F. H. A. Marshall (*Jour. Genetics, 1 (1910), No. 1, pp. 70–72*).—The right ovary and the greater part of the fallopian tube were removed from a female albino rat and the same parts from the left side of another rat. Both individuals gave birth to male and female offspring, which disproves the right and left ovary theory of sex, at least in rats.

Horns and antlers, Fambach (*Ztschr. Naturw., 81 (1909), No. 4, pp. 225–264, figs. 19*).—A critical review of histological studies on the growing tissues of horns and antlers.

DAIRY FARMING—DAIRYING.

Lectures on dairying, B. Bøggild (*Mælkeritid., 23 (1910), Nos. 35, pp. 755–766; 37, pp. 804–812; 39, pp. 857–867; 41, pp. 903–909*).—These lectures on the demands of milk hygiene and its effect on milk prices, the Danish cow testing associations, the Copenhagen milk supply, and dairy legislation in Denmark were delivered in the United States during the author's visit in the summer of 1910.

Dairy bacteriology, A. Wolff (*Centbl. Bakt.* [etc.], *2. Abt., 28 (1910), No. 16–19, pp. 417–422*).—A review of important contributions to our knowledge of dairy bacteriology which appeared in German periodicals in the past few years.

Has the dry matter in different root crops the same feeding value? N. Hansson (*Meddel. Centralanst. Försöksv. Jordbruksområdet, 1910, No. 34, pp. 69*).—An account of a series of experiments with milch cows, conducted in 1908–1910 at 2 Swedish dairy farms, in which the feeding values of mangels, ruta-bagas, turnips, and carrots were compared in rations for dairy cows.

Complete chemical analyses were made of all feeds which the cows received during the trials. Analyses of the different root crops showed but little variation in dry matter, with the exception of the sugar content, and that the digestible protein of mangels, fodder beets, and ruta-bagas was about 0.4 to 0.5 per cent.

The average percentage of dry matter in the different varieties of root crops was as follows: Mangels, Eckendorf 12.16, Regia 11.95, Golden Tankard 11.82, Barres 11.99, Sirimmer 14.40, and Light Red Bottle 15.61 per cent, an average of 12.99 per cent; ruta-bagas, Yellow Swedish 13.48 and Bangholm 11.19 per cent, an average of 12.34 per cent; turnips, Bortfeld 8.47 and Oestersundom 10.09 per cent, an average of 9.28 per cent; and carrots, 13.67 per cent.

The feeding experiments were conducted according to the Fjord group system, 6 cows being placed in each group. The average daily allowance of roots in the rations of the cows ranged in these experiments from 15.5 kg. (Light Red Bottle mangel) to 49.2 kg. (Bortfeld turnip), the average amounts of dry substance furnished in the form of roots being about 2.4, 3.8, 2.4, and 3.6 kg. per cow daily for the 4 trials.

The general conclusion is drawn that no difference could be traced as regards the influence of the several root crops on the milk yields or the live weights of the cows, or on the fat contents of the milk produced, and that the dry matter in the various root crops may, therefore, in general be considered of equal value for milk production.

Dairy cattle, J. H. Grisdale (*Canada Expt. Farms Rpts. 1910, pp. 64–78*).—This contains records of the station herd in 1909 and details of the methods of feeding practiced. Brief notes on feeding experiments are also reported.

Should one produce butter fat with milk high or low in fat content? K. Åkerberg (*Deut. Landw. Presse, 37 (1910), No. 100, pp. 1093, 1094; Milch Ztg., 40 (1911), No. 7, pp. 65–67*).—The view is suggested that when feeding stuffs rich in protein are high in price a cow which gives a small quantity of rich milk may be more profitable than one which gives a large yield of milk containing a small percentage of fat, because in the latter case a large amount of surplus protein must be secreted. According to tables presented, the average cow of the East Friesian breed must produce 281.4 kg., the Angler breed 256.1 kg., and the Simmental breed 224.9 kg. of solids-not-fat in order to produce 100 kg. of fat. Consequently, the East Friesian cow will be required to produce 56.5 kg. more of the unnecessary solids-not-fat than the Simmental cow, and this can not be done without consuming more digestible protein than the cow giving milk containing a high fat content.

Experimental contribution to the question of the relation between the placenta and activity of the mammary gland, R. LEDERER and E. PŘIBRAM (*Pflüger's Arch. Physiol., 134 (1910), No. 9–10, pp. 531–544, pl. 1*).—Intravenous injections of fresh placental extracts stimulated the action of the mammary gland in goats. After a few days the effect was weaker and the extract had to be more highly concentrated. The entire effect was lost in 2 or 3 weeks.

Contribution to the knowledge of individual cow's milk, O. MEZGER, K. FUCHS, and H. JESSER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 12, pp. 720–725*).—Analyses are reported which show the variations in chemical, physical, and biological constants of the milk from the same cow. Deviations from the normal are discussed.

Yeast in milk and milk products, W. DOMBROWSKI (*Centbl. Bakt. [etc.], 2. Abt., 28 (1910), No. 12–15, pp. 345–403, pls. 2*).—Yeasts were found present in all samples of milk and milk products. The Torula group were more frequent than those belonging to the Saccharomyces and Mycoderma groups. The activities of the yeasts were not limited to alcoholic fermentation, as they were found to produce colors and flavors, while others showed no fermentative activity whatsoever. Methods of distinguishing the different species that grow in pure cultures and their adaptability to lactic acid, salt, and concentrated sugar solutions are described in detail.

Numerous references to the literature are given.

Two cases of ropy milk, C. BARTHEL (*K. Landtbr. Akad. Handl. och Tidskr., 49 (1910), No. 6, pp. 516–519; Centbl. Bakt. [etc.], 2. Abt., 28 (1910), No. 25, pp. 614–617*).—The cause of the trouble was found to lie in the presence in one case of *Bacterium lactis viscosus*, isolated by Adametz, and in the other of a species belonging to the aerogenes group.

Examination of milk from a health standpoint, F. H. LAMB (*Quart. Bul. Ohio Bd. Health, 2 (1910), No. 4, pp. 242–246*).—A critical discussion of the technique employed in determining the temperature, specific gravity, and the content of fat, sediment, and bacteria.

Milk in its relation to infant mortality, J. H. LANDIS (*Quart. Bul. Ohio Bd. Health, 2 (1910), No. 4, pp. 246–251*).—A consideration of the reduction of infant mortality in a number of large cities, due to an improved milk supply.

An outbreak of milk-borne scarlet fever, J. R. HUTCHINSON (*Pub. Health [London], 24 (1911), No. 4, pp. 143–148*).—An investigation of this epidemic seemed to indicate that it was caused by a mild attack of scarlet fever in an attendant who unwittingly infected the milk either when acting as a milker or a can washer. The disease was apparently contracted in a very mild form by two others in the house who assisted in the conduct of the milk trade.

An outbreak of scarlet fever, F. DITTMAR and J. P. MCGOWAN (*Pub. Health [London], 24 (1911), No. 4, pp. 138–142*).—A case was investigated where milk was apparently the cause of spreading scarlet fever, but a human source of infection of the milk was not discovered. There was a teat eruption in a number of cows during the height of the outbreak but there was no evidence that it was the cause of the scarlet fever.

Butter, A. MCGILL (*Lab. Inland Rev. Dept. Canada Bul. 219, pp. 19*).—Analyses of 211 samples of butter collected in June and July, 1910, are reported.

A statistical contribution to the knowledge of the composition of butter in Holland and northern Russia, M. FRITZSCHE (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 7, pp. 409–448, figs. 16; abs. in Rev. Gén. Lait, 8 (1910), No. 18, pp. 425, 426*).—A compilation and tabulation of the physical and chemical constants of butter as reported from official sources.

On an average, in Holland butter the Reichert-Meissl number was about 28, but somewhat higher in April and lower in October. The index of refraction at

40° C. ranged from 40 to 48.4. In the butter of northern Russia the Reichert-Meissl number and the index of refraction were lower, and the saponification number was higher than in the Holland butter.

Report on Swedish butter exhibitions, 1909 (*Meddel. K. Landtbr. Styr. [Sweden], 1910, No. 1 (148), pp. 45+40*).—During the year 482 creameries took part in the exhibitions and 2,337 butter tubs were scored and examined. The average percentage of water in the samples from any one creamery was 13.8, with a range of from 11.6 to 15.8 per cent; the average refractive index was 51.4, and the Reichert-Meissl numbers were 29.48, 28.82, and 29.15 cc. for the winter, summer, and fall periods, respectively.

The manufacture of butter for storage, L. A. Rogers (*Cream. Jour., 21 (1911), No. 24, pp. 11, 16, 17, charts 2*).—An address before the American Warehousemen's Association, Washington, December, 1910, on factors which cause the changes in the flavor of butter during storage, with suggestions concerning practical methods of controlling them.

Dairy industry in Saskatchewan, J. E. Jones (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 6, pp. 90, 91*).—The output of butter in the Province of Saskatchewan has increased 300 per cent since the organization of the dairy branch in 1906. This is due largely to the policy of the government, which is encouraging the centralizing of creameries at points best adapted to dairying.

Studies of kumiss, B. Rubinsky (*Centbl. Bakt. [etc.], 2. Abt., 28 (1910), No. 6–8, pp. 161–219, pl. 1*).—Four species of organisms were commonly found present in kumiss; namely, a kumiss yeast, a kumiss bacterium, *Streptococcus lactis*, and *Bacterium aërogenes*. Frequently there was a fifth organism, *Bacterium caucasicum* Nicolajewa. The first two organisms, however, were the only species absolutely necessary in the preparation of kumiss. The others assist indirectly by the formation of acid and thus prevent the growth of undesirable species.

The rôle of each of these organisms is described in detail, and the therapeutic action of kumiss is discussed. There are many references to previous investigations.

Cheese defects, J. H. Monrad (*N. Y. Produce Rev. and Amer. Cream., 31 (1910), Nos. 1, pp. 20, 21; 2, pp. 78, 80, 81; 3, pp. 110, 111; 4, pp. 150, 151*).—An alphabetical list of terms used to describe cheese defects. These are also classified as follows: (1) Bacterial, yeast, and mold defects, (2) defects due indirectly to feed, (3) chemical defects, and (4) manufacturing defects. Those of the first class are further subdivided according to changes in (a) texture, (b) color, (c) flavor, and (d) formation of poisons.

Construction and arrangement of cheese factories, M. Reinisch (*Österr. Molk. Ztg., 17 (1910), No. 24, pp. 325–328, figs. 10*).—Plans of several small and medium size establishments for the manufacture of cheese are illustrated and described.

Refrigeration in dairying, F. Ertel (*Österr. Molk. Ztg., 17 (1910), Nos. 19, pp. 257–260; 20, pp. 272–274; 21, pp. 283–286, figs. 2*).—A discussion of the comparative merits of refrigeration in dairies with ice, ammonia, sulphur dioxid, and carbon dioxid. Estimates of the cost of installation, operation, and depreciation of the different systems are given.

Additional remarks on refrigeration in dairying (*Österr. Molk. Ztg., 17 (1910), No. 24, p. 328*).—A criticism of the article noted above.

A milk foam preventer (*Österr. Molk. Ztg., 17 (1910), No. 24, p. 331, fig. 1*).—A patented apparatus to prevent the formation of foam is illustrated and described.

VETERINARY MEDICINE.

Manual of tropical medicine, A. CASTELLANI and A. J. CHALMERS (*London, 1910, pp. XXIII+1242, pls. 14, figs. 373; rev. in Jour. Trop. Med. and Hyg. [London], 13 (1910), No. 11, pp. 173, 174*).—This work on tropical medicine is divided into 3 parts: (1) Introduction (pp. 1–82), (2) the causation of disease in the tropics (pp. 85–628), and (3) the diseases of the tropics (pp. 631–1165). Subject matter and author indexes are appended.

Tropical medicine and hygiene (*London, 1909, pt. 1, pp. IV+264, pls. 2, figs. 62; 1910, pt. 2, pp. VIII+283, pl. 1, figs. 98*).—The first volume, devoted to diseases due to protozoa, is by C. W. Daniels and E. Wilkinson. The second volume, devoted to diseases due to metazoa, is by C. W. Daniels and includes a chapter by A. Alcock on snakes.

A compend of parasitology, E. BRUMPT (*Précis de Parasitologie. Paris, 1910, pp. XXII+915+32, pls. 4, figs. 683*).—Part 1 of this work is devoted to the animal parasites and part 2 (pp. 683–890) to the vegetable parasites.

Sixteenth semiannual report of the chief of the cattle bureau, A. PETERS (*Agr. of Mass., 57 (1909), pp. 131–163*).—The diseases the occurrence of which is here recorded include rabies, glanders, tuberculosis, and others. Under the heading of meat inspection the importance of a rigid state inspection is emphasized.

Report of proceedings under the diseases of animals acts for the year 1909 (*Dept. Agr. and Tech. Instr. Ireland, Rpt. Diseases Anim., 1909, pp. 79, pls. 2, dgms. 2, map 1*).—The chief inspector of the veterinary branch, M. Hedley, presents a special report on hog cholera and other diseases of animals in the island in 1909 with maps, diagrams, and photographs (pp. 11–31), and the superintendent of transit of the veterinary branch, D. S. Prentice, a special report on the transit of animals (pp. 32–41). Statistical and other data are given in the appendixes.

Report of the chief veterinary surgeon for the year 1909, J. D. BORTHWICK (*Rpt. Dept. Agr. Cape Good Hope, 1909, pp. 35–46*).—The occurrence during the year of important diseases, including anthrax, epizootic lymphangitis, glanders, lung sickness, redwater, scabies, quarter evil, tuberculosis, and East Coast fever, is reported.

[Veterinary reports], A. GRIST ET AL. (*Dept. Agr. Orange River Colony, Ann. Rpt., 5 (1908–9), pp. 75–106, pl. 1*).—The occurrence of diseases of stock in Orange River Colony during the year ended June 30, 1909, is reported upon.

Annual report of the civil veterinary department, United Provinces, for the year ending March 31, 1910 (*Ann. Rpt. Civ. Vet. Dept. United Prov., 1910, pp. 21*).—Brief accounts of the occurrence of disease are included in this report.

Experimental and clinical hypersensitiveness (anaphylaxis), E. MORO (*Ergeb. Allg. Path. Mensch. u. Tiere, 14 (1910), pt. 1, pp. 429–593*).—This is an extensive review of practically all of the clinical observations and experimental work done in regard to anaphylaxis.

A large bibliography is appended.

The error in differential leucocyte counting, F. M. BARNES, Jr. (*Folia Haematol., 9 (1910), No. 1, pp. 87–93; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 5 (1910), No. 18, p. 704*).—This is a comparative study of various microscopic preparations with Ehrlich's triacid and Hastings' (modification of Romanowski's method) stain. The results favor the Hastings method.

The value of collodion membranes as filters, EDNA STEINHARDT (*Jour. Infect. Diseases, 7 (1910), No. 5, pp. 675–679*).—Dilute diphtheria toxin was retained by the collodion membrane, while the undiluted toxin passed through freely. When dilute cobra venom was filtered, all toxicity was lost, but on filtering successive quantities through the same collodion membrane, the filtrate gradually became toxic, until the fourth filtrate was practically of the same strength as the control. This result is in accord with the work of Marbe,[a] on the successive filtration of agglutinins through collodion sacs, and also with the gradual passage of complement through a Berkefeld filter, as shown by the author,[b] and later found by Muir and Browning[c] working on the same subject.

"Evidently filtration through collodion sacs, as through Berkefeld filters, is a phenomenon of adsorption, the substances in solution passing through when adsorption has reached a certain degree. Formed particles, however, if able to pass through at all, would pass through more rapidly in the beginning of filtration, and later, as the pores become clogged, they would be retained, while the opposite would occur with soluble substances, which appear in the filtrate only after adsorption has become more or less complete.

"Thus, by changing the concentration, the quantity to be filtered, or the thickness of the sac, results may be obtained varying from total retention to complete passage of the active substances through the collodion membrane."

The bacterial integrity of collodion sacs, C. A. FULLER (*Jour. Infect. Diseases, 7 (1910), No. 5, pp. 664–674, figs. 4*).—The author states, as the result of his work with *Bacillus typhosus, B. coli, B. prodigiosus, B. pyocyaneus,* and the bacteria of crude sewage or septic tank effluent, that collodion sacs made according to Frost's method will retain their bacterial integrity for months.

Poisonous and medical plants of Missouri, L. H. PAMMEL (*Ann. Rpt. Mo. Bd. Hort., 3 (1909), pp. 174–193, pls. 26; Missouri Bd. Hort. Bul. 14* [*1910*], *pp. 46, figs. 26*).—A condensation of the publication previously noted (E. S. R., 24, p. 384).

Forage poisoning or cryptogamic poisoning; also called enzootic cerebritis, epizootic cerebro-spinal meningitis, leuco-encephalitis, etc., C. H. STANGE (*Amer. Vet. Rev., 38 (1911), No. 4, pp. 473–488, figs. 24*).—Two outbreaks of this affection that came under the author's observation during the year are reported. In the first outbreak, which was caused by the feeding of moldy silage, 9 out of 11 animals died. In the second outbreak, which was among animals fed on hay cut from an old swamp that had been plowed up and seeded, 3 out of 4 affected animals succumbed. Part of a report by R. E. Buchanan (E. S. R., 23, p. 630) on the mold *Monascus purpureus,* thought to have been responsible for the death of the 9 animals to which moldy silage was fed, is reprinted.

A brief account of chronic bacterial enteritis (Johne's disease), including the report of a case that occured in Iowa, is appended to the paper.

An organism simulating anthrax, F. S. H. BALDREY (*Jour. Trop. Vet. Sci., 5 (1910), No. 4, pp. 580–583*).—The author describes an organism which is seldom sufficiently pathogenic to cause death by subcutaneous inoculation, but which frequently induces a severe necrosis and a gangrenous condition at the seat of inoculation which tends to spread and can be cured only with great difficulty by surgical and antiseptic means. In some cases only a severe edematous and inflammatory swelling or lymphangitis is induced.

In regard to the identity of the causative agents of hog erysipelas, erysipeloid, and mouse septicemia, RICKMANN (*Ztschr. Hyg. u. Infektionskrank., 64 (1910), No. 3, pp. 362–364; abs. in Hyg. Rundschau, 20 (1910), No. 17, p.*

[a] Compt. Rend. Soc. Biol. [Paris], 67 (1909), p. 809.
[b] Jour. Med. Research, 13 (1904), p. 409.
[c] Jour. Path, and Bact., 13 (1909), p. 232.

965).—The author considers the bacteria causing the 3 above-named diseases as identical.

Experimental treatment of epizootic lymphangitis in Senegal, L. TEPPAZ (*Bul. Soc. Path. Exot., 3 (1910), No. 7, pp. 450–453*).—In the experiments here briefly reported, in which a number of drugs were used, the injection of potassium iodid into the jugular vein was the only treatment that gave appreciable results.

The pathogenesis of Micrococcus melitensis, J. EYRE (*Proc. Roy. Soc. Edinb., 29 (1908–9), No. 6, pp. 537–581, charts 22*).—A detailed report of studies of *M. melitensis*, which is virulent to a greater or lesser degree for all the usual laboratory animals, guinea pigs, rabbits, rats, mice, dogs, and monkeys. By means of suitable passages its virulence for any particular species can be considerably increased.

The diagnosis of glanders by the precipitation reaction of Konew, J. R. MOHLER (*Amer. Vet. Rev., 38 (1911), No. 4, pp. 518–524, fig. 1*).—The author describes the test, which has been previously noted (E. S. R., 24, p. 184), and details his findings with it in the laboratory of the Bureau of Animal Industry of this Department and in the field.

The results obtained were considered good. He further found that the cloudy ring formed in the test can be made more distinct by adding a few drops of an aqueous solution of methylene blue to the mallease reagent previous to adding the serum.

Précis of reports submitted by district residents concerning tsetse fly and cattle disease in the Nyasaland Protectorate, J. B. KEEBLE (*Bul. Ent. Research, 1 (1910), No. 3, pp. 203–212, map 1*).—Abstracts of reports sent in by district residents are presented.

Five-day spraying.—The brown tick and the East Coast fever, W. F. COOPER (*Jour. Agr. Sci., 3 (1910), No. 3, pp. 285–296*).—"Though these trials are the first of their class to be recorded, and only form a preliminary experiment, I certainly do think that they show that, until we have more experimental data, very little reliance can be put on the five-day spraying as a preventive against East Coast fever; at any rate, unless the cattle have been dipped continually for some time previously."

The piroplasmoses, D. E. SALMON (*Rev. Med. Vet. Montevideo, 1 (1910), No. 1–6, pp. 24–98, figs. 20*).—Following a brief discussion of the rôle of ticks in the transmission of piroplasmosis, summarized accounts are given of bovine, canine, equine, ovine, African Coast, tropical bovine, and English piroplasmosis.

A contribution to the diagnosis of the diseases in cattle caused by small piroplasms with a consideration of their distribution, G. LICHTENHELD (*Ztschr. Hyg. u. Infektionskrank., 65 (1910), No. 3, pp. 378–390, figs. 3; abs. in Jour. Trop. Vet. Sci., 5 (1910), No. 4, pp. 621–624*).—*Piroplasma parvum* and *P. mutans* are the species concerned in this discussion.

A contribution on the cultivation of piroplasmata in artificial media, B. DESELER (*Ztschr. Hyg. u. Infektionskrank., 67 (1910), No. 1, pp. 115–134, pl. 1*).—Cultivation experiments with *Piroplasma canis* are reported. A bibliography of 26 titles relating to the subject is appended to the paper.

Investigations of oriental sore: Cultivation, experimental reproduction, immunization, C. NICOLLE and L. MANCEAUX (*Ann. Inst. Pasteur, 24 (1910), No. 9, pp. 673–720, figs. 3*).—This is a detailed account of the investigations noted from another source (E. S. R., 23, p. 483).

Sarcosporidiosis in the opossum and its experimental production in the guinea pig by the intramuscular injection of sporozoïtes, S. T. DARLING (*Bul. Soc. Path. Exot., 3 (1910), No. 8, pp. 513–518*).—The author here records the occurrence of sarcosporidia in an opossum (*Didelphis* sp), captured at Ancon, Canal Zone. "The fresh sporozoites in saline solution after intramuscular inoculation into the tissues of a guinea pig took on an atypical development and produced sporozoa not unlike those found by the writer in man (1) and in the guinea pig (2) after feeding with sporozoites from *Sarcocystis muris* from the rat."

Experimental investigations of Streptococcus equi, A. Pricolo (*Clin. Vet. [Milan], Sez. Sci., 32 (1909), Nos. 1, pp. 1–10; 2–3, pp. 96–107; 4–5, pp. 207–227; 6, pp. 279–284; 33 (1910), No. 1–3, pp. 89–143; abs. in Bul. Inst. Pasteur, 8 (1910), No. 8, pp. 349, 350*).—Investigation of the cultural and biological properties of *S. equi* are reported in this monograph.

Transmission of surra, F. S. H. Baldrey (*Jour. Trop. Vet. Sci., 5 (1910), No. 4, pp. 595, 596, charts 6*).—Trypanosomes were demonstrated in the blood of a pig 5 days after it was inoculated with 2 cc. of blood from a surra pony, remaining present for 5 days. They appeared again 18 days after inoculation and remained for 3 days. The possibility of the pig being a carrier of surra is therefore considered to have been demonstrated and, because of its habits, it is considered a source of danger. Charts of 2 animals are attached showing the course of the disease in the pig and in a test guinea pig.

Elephant surra.—Trypanosomiasis in the elephant, G. H. Evans and T. Rennie (*Jour. Trop. Vet. Sci., 5 (1910), No. 4, pp. 535–568*).—The authors record the results of inoculations of a number of laboratory animals with trypanosomes obtained from elephants in the Yamethin district of Burma.

Note on the passage of a human trypanosome through domestic animals, L. E. W. Bevan and M. E. MacGregor (*Jour. Compar. Path. and Ther., 23 (1910), No. 2, pp. 160–167, fig. 1*).—Experiments in which the guinea pig, rabbit, white rat, sheep, and mule were used are reported.

"In the case of the sheep (a native fat-tail ewe), artificial inoculation gave rise to an infection no less severe than that occurring in sheep under observation at the same time which had been inoculated with the *Trypanosoma dimorphon* of Northern Rhodesia and the animal trypanosome of the dimorphic type of Southern Rhodesia. Again, the mule offered no resistance to a single inoculation with the human trypanosome, which produced a far more severe reaction than the animal trypanosome of Southern Rhodesia—a point of some importance, since that parasite has been held by some to be *T. dimorphon*, a trypanosome first discovered by Dutton and Todd in Senegambia and responsible for a serious disease in equines. Indeed, the human trypanosomes in the mule were always far more plentiful and more constantly present in the peripheral blood than the animal parasite, which required repeated inoculations to produce infection in mules, horses, and donkeys. Although careful observations in sleeping sickness areas have failed to discover *T. gambiense* existing naturally in the blood of domestic animals, further observation appears necessary before these can be excluded as possible hosts of the human parasite."

The anatomic principle underlying the tendency of the lungs toward tuberculous disease, C. Hart (*Ergeb. Allg. Path. Mensch. u. Tiere, 14 (1910), pt. 1, pp. 337–428*).—After giving an extensive review of the literature on this subject, the author states that aside from the actual infection by the tubercle bacillus the prevailing view in regard to the importance of the tendency of the lungs toward tuberculosis is justified.

An excellent bibliography is appended.

The frequency, origin, and channels of infection of tuberculosis in man, H. Beitzke (*Ergeb. Allg. Path. Mensch. u. Tiere, 14 (1910), pt. 1, pp. 169–336*).—This is an extensive review of the work done and views expressed in regard to the frequency and origin of tuberculosis in man. The chapter on the origin of tuberculosis considers both the human and animal sources.

The bibliography appended is very large.

A new type of tubercle bacillus pathogenic in man and the lower animals, C. SPENGLER (*Ztschr. Expt. Path. u. Ther., 6 (1909), No. 3, pp. 748–758, figs. 7; abs. in Jour. Roy. Micros. Soc.* [*London*], *1910, No. 4, p. 501*).—The author describes a new variety of tubercle bacillus to which he gives the name "humano-longus." It occurs principally in severe cases of phthisis, more particularly in patients from the East. It grows slowly upon glycerin serum and glycerin agar, but upon a somatose-peptone-glycerin-agar medium colonies appear in from 2 to 6 weeks. It is longer and thicker than Koch's bacillus, forms spores which can be stained by Gram's method, and possesses a relatively high degree of pathogenicity for man and animal.

The use of antiformin for detecting tubercle bacilli in milk and milk sediment, MIESSNER and KÜHNE (*Mitt. Kaiser Wilhelms Inst. Landw. Bromberg, 2 (1910), No. 3, p. 309; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 37, pp. 730, 731*).—The authors show that a 2 per cent antiformin solution is capable of preventing coagulation of milk for a period of 5 days and that tubercle bacilli can be detected in such milk providing the antiformin has not been added more than 2 days. See also previous notes (E. S. R., 20, p. 986; 21, p. 711; 23, p. 389).

On the application of tuberculin of avian tubercle bacilli as a diagnostic agent in contagious chronic intestinal inflammation of cattle, O. BANG (*Ber. K. Vet. og Landbohöjskoles Lab. Landökonom. Forsög* [*Copenhagen*], *66 (1910), pp. 41–50*).—Previously noted from another source (E. S. R., 22, p. 287).

Bovine tuberculosis in Iowa herds, H. E. TALBOT (*Amer. Vet. Rev., 37 (1910), No. 6, pp. 736–745*).—A paper read before the Iowa Veterinary Association.

The prevention of tuberculosis in cattle, J. NIVEN (*Brit. Med. Jour., 1909, No. 2541, pp. 699–702; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 4 (1910), No. 9, p. 491*).—"An abstract of the measures in force in Manchester, and a series of suggestions, which are as follows: That money be lent at a low rate by the country to pay for rehousing, in farms where there is much tuberculosis; that the country shall provide veterinary surgeons and tuberculin to examine herds of cows, and shall make good any losses in the first instance; that the maintenance of nontuberculous herds be made compulsory, the farmer to pay for any renewal of stock; that consuming communities shall have the right of control over the production of milk which they consume; and that milk dealers entering into contracts shall be obliged to satisfy themselves that the milk is produced under reasonably healthy conditions."

Specific chronic enteritis of cattle, B. BANG (*Ber. K. Vet. og Landbohöjskoles Lab. Landökonom. Forsög* [*Copenhagen*], *66 (1910), pp. 5–40, pls. 3, figs. 3*).—Previously noted from another source (E. S. R., 24, p. 283).

Coccidiosis of African cattle, A. BALFOUR (*Bul. Soc. Path. Exot., 3 (1910), No. 7, pp. 429–431*).—The author reports the probable occurrence of coccidiosis in cattle at Wau, Bahr-El-Ghazal.

Bacillus abortus of Bang, the cause of contagious abortion in cattle, W. J. MACNEAL and JOSEPHINE E. KERR (*Jour. Infect. Diseases, 7 (1910), No. 3, pp. 469–475; Jour. Trop. Vet. Sci., 5 (1910), No. 4, pp. 629–634*).—Following a review of investigations relating to this subject, 19 cases studied are briefly reported, a summary of which is as follows:

"Of the 19 cases examined 2 were sows and 17 were cows. Of these latter, 10 were delivered at term. In the other 7 delivery was premature. Of these, one case, No. 6, was clinically not an abortion due to infection. This leaves 6 cases which were clinically cases of contagious abortion. Two of these, cases 1 and 2, were examined before the plate method was employed, and cultures were negative. A guinea pig inoculated from case 2 aborted. Of the 4 remaining cases, No. 3 and No. 11 gave positive cultures of *B. abortus* from the placenta in each case. In case 7 only a bit of membrane without placental tissue was available and in case 10 only some of the discharge gathered from the ground. Both of these, examined by the plate method, gave negative results.

"Subcutaneous inoculation into a pregnant female guinea pig of a broth culture of the mixed bacteria of a contaminated placenta produced abortion in 26 days. Intravaginal application of the same material in another pregnant female guinea pig was without result. Subcutaneous inoculation of a broth suspension of infected placenta into a pregnant female guinea pig produced abortion in 10 days, and the subcutaneous inoculation of a pure culture of *B. abortus* isolated by the Nowak plate method from the same placenta caused a premature delivery after 3½ days in one guinea pig and an abortion 8 days after inoculation in a second guinea pig. From this last animal the bacillus was recovered from the point of inoculation, from the interior of the uterus, and from each of the 2 placentæ.

"From this rather limited series of examinations and experiments we may conclude that the bacillus of Bang is the microbic cause of at least some of the contagious abortion of cattle in this country."

The microbe of contagious abortion in cows, F. Tidswell (*Agr. Gaz. N. S. Wales, 21 (1910), No. 11, pp. 991–1000*).—This is a summarized account of the present status of our knowledge of this disease.

A contribution to the pathogenesis and treatment of hyposeræmia [milk fever], H. R. Bredo (*Bul. Soc. Cent. Méd. Vét., 86 (1909), No. 12, pp. 228–242; abs. in Amer. Vet. Rev., 37 (1910), No. 6, pp. 799–802*).—An abstract of this paper has been previously noted (E. S. R., 23, p. 587).

Gall-sickness of South Africa (anaplasmosis of cattle), A. Theiler (*Jour. Compar. Path. and Ther., 23 (1910), No. 2, pp. 98–115*).—In this article the author reviews the literature on *Anaplasma marginale*, showing that it occurs in the United States and South America as well as in South Africa. It is shown that this parasite is the cause of a typical disease, a grave anemia, which to a great extent resembles that caused by *Piroplasma bigeminum*. "We may safely state that anaplasmosis represents the genuine gall-sickness, since the piroplasmosis is usually accompanied by hemoglobinuria, and this symptom permits of the differentiation." The various forms of anaplasmosis and the lesions are described. (See also a previous note, E. S. R., 24, p. 386.)

Piroplasmosis of cattle in Queensland, S. Dodd (*Jour. Compar. Path. and Ther., 23 (1910), No. 2, pp. 141–160*).—The author finds that there are 2 distinct forms of pathogenic piroplasms in Australia, namely, *Piroplasma bigeminum* and a smaller form that is morphologically identical with *P. mutans*. In Queensland with cattle infected by this smaller form, which is referred to as "rings and rods," the period of incubation is from 3 to 33 or even 54 days in cases of mixed infection and from 5 to 15 days in cases of pure infection.

"The disease caused by the smaller piroplasm (rings and rods) when reproduced by inoculation of blood by means of a syringe has so far been of a mild character as a rule, even when large doses of blood were used, but in spite of this there is evidence to show that the disease when naturally set up by the tick is of a much more virulent nature. Variation in virulence between artificially and naturally infected cases is not peculiar to the organism under consideration. The disease caused by the small piroplasm (rings and rods) can in Australia be transmitted by means of the ordinary cattle tick (*Margaropus australis*), the same tick as is responsible for ordinary redwater or tick fever. Therefore the same tick can, and probably often does, infect an animal with both diseases simultaneously."

Preliminary note on a trypanosome of British cattle, S. STOCKMAN (*Jour. Compar. Path. and Ther., 23 (1910), No. 2, pp. 189–192, fig. 1*).—The discovery of a nonpathogenic trypanosome in the blood of English cattle is recorded. Attempts to cultivate this trypanosome on artificial media have failed. Morphologically it appears to be indistinguishable from *Trypanosoma theileri*.

Report of an outbreak of hemorrhagic septicemia in sheep, S. H. WARD and W. L. BEEBE (*Amer. Vet. Rev., 38 (1911), No. 5, pp. 649–655*).—The authors here report on an investigation made of an outbreak of hemorrhagic septicemia in a flock of 2,700 sheep that were shipped from Cle Elum, Wash., to Chicago. *Bacterium ovisepticus* was isolated and proved by inoculation to be the cause of the disease.

Osseous cachexia: A malignant bone disease of sheep, H. A. REID and B. C. ASTON (*Jour. New Zeal. Dept. Agr., 1 (1910), No. 6, pp. 422–427, figs. 2*).—The occurrence in New Zealand of osseous cachexia, more commonly known as osteomalacia, is recorded for the first time.

The caseous suppuration of sheep and goats, H. CARRÉ (*Rev. Gén. Méd. Vét., 16 (1910), No. 191, pp. 617–627, fig. 1*).—This is a further discussion of the subject (E. S. R., 22, p. 788.)

Results with Suptol-Burow in swine plague, TILLMANN (*Berlin Tierärztl. Wchnschr., 26 (1910), No. 39, p. 758*).—Good results were obtained with this preparation.

An atlas of equine anatomy, R. SCHMALTZ (*Atlas der Anatomie des Pferdes. Berlin, 1909, pt. 2, pp. [15], pls. 24–62*).—This second part deals with the topographical myology of the horse.

The treatment of equine pneumonia by hydrogen peroxid, BOUCHET (*Rev. Gén. Méd. Vét., 16 (1910), No. 181, pp. 1–7; abs. in Vet. Rec., 23 (1910), No. 1170, pp. 367, 368*).—The author records the results of a new treatment which he adopted during an epidemic of equine pneumonia.

All of the 11 pneumonic horses that were daily injected intravenously with from 40 to 180 cc. of peroxid of hydrogen recovered. Only two accidents, neither of them serious, occurred in the course of the numerous injections that were made. One was a slight case of hemoptysis; the other was a local reaction in the jugular region, due to the injection of some of the solution into the peri-venous connective tissue. The peroxid of hydrogen used was of 12 volume strength, free from impurities and excessive acidity, and not more than 150 cc. was injected at one time.

Infectious epidemic epididymo-vaginalitis of the horse: A clinical, anatomo-pathological, and bacteriological study, F. GUIDO (*Rev. Gén. Méd. Vét., 16 (1910), No. 183, pp. 129–150, figs. 15; abs. in Vet. Rec., 23 (1910), No. 1168, pp. 340, 341*).—The author reports upon anatomo-pathological and bacteriological studies of material obtained by Vallée, Lesueur, and Lavergne during an epizootic among a troop of 39 horses at Havre in 1905.

The causative agent was found to be a very small polymorphous bacillus of from 3 to 5 micro-millimeters long by from ½ to 1 micro-millimeter broad; it is found either in an isolated form or as a strepto-bacillus. It is extremely mobile and stains well with all the basic aniline dyes, but does not take either the Gram or Claudius stain. It is aerobic and grows well in all the ordinary media, particularly in glycerinated media between 20 and 38° C. Vallée believes in an ascending infection by the urethra, but an experimental attempt to infect in this way gave a negative result. A fresh culture of the organism was injected into the urethra but no pathogenic effects resulted.

Some canine notes, W. JOWETT (*Agr. Jour. Cape Good Hope, 37 (1910), No. 5, pp. 518–527*).—In continuing experiments with canine piroplasmosis (E. S. R., 23, p. 589) the author finds that susceptible canines may be "salted" by infecting them with a virus and injecting trypanblue as soon as the parasites appear in the blood. Two canine diseases often confounded with biliary fever, namely, canine distemper and epizootic gastro-enteritis, are briefly considered.

White diarrhea in chicks, L. F. RETTGER (*Amer. Poultry World, 1 (1910), No. 3, pp. 160, 213*).—This account is based on investigations previously noted (E. S. R., 22, p. 489).

Malta fever in fowls, DUBOIS (*Rev. Vét. [Toulouse], 35 (1910), No. 8, pp. 490–492*).—In this preliminary note the author reports upon an epizootic that occurred among fowls in the suburbs of Nîmes, France, resulting in a mortality of 70 per cent. Ten of 17 fowls that were tested gave the agglutination reaction for *Micrococcus melitensis*.

The microbe of avian diphtheria, J. BORDET and V. FALLY (*Ann. Inst. Pasteur, 24 (1910), No. 7, pp. 563–568, pl. 1; abs. in Vet. Rec., 23 (1910), No. 1167, p. 323*).—The authors describe a micro-organism in connection with avian diphtheria which differs essentially from those dealt with by other investigators. It does not develop on the ordinary culture media, and even upon media which contains defibrinated blood the growth is so thin that it almost escapes observation. Giemsa's stain gave the best results. The micro-organism is nonmotile, grows fairly rapid, and its vitality is fairly great. The disease was transmitted to fowls, causing the characteristic lesions, and an extraordinary abundance of germs were found in the exudate.

The parasitic protozoa of ruminants' stomachs, E. LIEBETANZ (*Arch. Protistenk., 19 (1910), No. 1, pp. 19–80, pls. 2, fig. 1*).—A bibliography of 42 titles accompanies this account.

Concerning two new species of worms: Trichosomum papillosum and Heterakis cylindrica, K. L. BLOME (*Ztschr. Veterinärk., 21 (1909), No. 8–9, pp. 353–368, pls. 3; abs. in Rev. Gén. Méd. Vét., 15 (1910), No. 180, pp. 716, 717*).—Nematodes found (in 2 instances) associated in the intestines of grouse (*Tetrao urogalle*), for the death of which they were responsible, are described as representing the new species, *T. papillosum* and *H. cylindrica*.

The cestodes in Procavia, C. JANICKI (In *L. Schultze's Zoologische und Anthropologische Ergebnisse einer Forschungsreise im Westlichen und Zentralen Südafrika, 1903–5. Jena, 1910, vol. 4, pt. 3, pp. 373–396, pls. 3*).—Seven species of Inermicapsifer, of which 2 are new, and 2 species of Tænia are recorded from this host.

An extracellular coccidium, Cryptosporidium muris n. g. and n. sp. of the gastric glands of the common mouse, E. E. TYZZER (*Jour. Med. Research, 23 (1910), No. 3, pp. 487–509, pls. 2*).—The author presents a report of biological studies of *C. muris*, a parasite frequently found in large numbers in the gastric glands of the tame varieties of the common mouse (*Mus musculus*).

Contagious diseases of bees of interest to veterinarians, TÖPFER (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 46, pp. 889–899*).—An account of bees and bee-keeping with a review of the present status of bee diseases.

Formaldehyde disinfection, with special reference to the comparative value of some of the proprietary products, M. L. HOLM and E. A. GARDNER (*Jour. Infect. Diseases, 7 (1910), No. 5, pp. 641–663*).—Experiments carried out in an ordinary papered room, the cracks in the doors, window frames, etc., of which had been carefully stopped up, are reported with the permanganate-formalin method [a] and a number of proprietary products.

---

[a] Pub. Health and Mar. Hosp. Serv. U. S., Hyg. Lab. Bul. 27.

RURAL ENGINEERING.

Report on the St. Francis Valley drainage project in northeastern Arkansas, A. E. MORGAN and O. G. BAXTER (*U. S. Dept. Agr., Office Expt. Stas. Bul. 230, pts. 1, pp. 100, pls. 2, figs. 9, dgms. 2, maps 5; 2, pp. 58*).—This is a detailed report on the project previously noted (E. S. R., 22, p. 190). Part 1 contains the general report of the survey and part 2 a list of the bench marks set during its progress.

Following a description of the valley as to its location, history, ownership, development of the levee system, topography, climate, soil, native vegetation, crops, land values, and drainage conditions, the run-off and factors affecting it are discussed, together with a detailed presentation of construction methods and cost, excavating machinery, the basis of estimates, hydraulic problems and coefficients, the survey and plan of work, the results to be expected, the advantages of a large district, the proper administration, future problems, and unit prices of estimates. A report of a board of consulting engineers endorsing the feasibility of the project is appended.

The estimated cost of the project is $7,595,703, or $9.04 per acre, with an annual expense for maintenance of from 2 to 4 per cent of the entire first cost. The benefits expected are in the improvement of the health conditions, fisheries, rice irrigation, roads, lumbering, railroads, power development, and water transportation.

A report upon the reclamation of the overflowed lands in the Marais des Cygnes Valley, Kansas, S. H. MCCRORY, D. L. YARNELL, and W. J. MCEATHRON (*U. S. Dept. Agr., Office Expt. Stas. Bul. 234, pp. 53, figs. 2, dgm. 1, maps 3*).—This report embodies the results of special field investigations and surveys made by engineers of this Office in 1909, and includes a discussion of the injury to agricultural lands by the overflow of the river, together with recommendations for relief and estimates of the probable cost of drainage works.

"By means of the improvements discussed in this report it is proposed to protect from overflow and make available for continuous cultivation 33,365 acres of fertile land in the Marais des Cygnes Valley at a cost of $665,500, or an average cost of $19.95 per acre of protected land. It is proposed, further, to increase the carrying capacity of the river channel throughout its length in Kansas and in Bates County, Mo., and thus reduce the height and duration of floods in the valley. This end is to be accomplished by clearing the channel at a cost of $139,720, or $1.76 per acre of benefited land. It is also planned to widen the river channel at Main Street, Ottawa, and thus relieve the congestion that occurs at this point, under present conditions, in time of flood. The cost of this channel is estimated at from $25,000 to $40,000."

Appendixes give data as to precipitation and stream flow measurements in the locality and a list of the permanent bench marks set.

A preliminary report on the drainage of the Fifth Louisiana Levee District, A. E. MORGAN, S. H. MCCRORY, and L. L. HIDINGER (*U. S. Dept. Agr., Office Expt. Stas. Circ. 104, pp. 35, figs. 2*).—This report presents the drainage problems as they exist in the Fifth Louisiana Levee District, points out certain general methods of inaugurating and proceeding with its drainage, and submits a crude estimate of the probable cost of main and lateral drainage under the conditions which are described. It discusses the necessity of adequate preliminary surveys and careful stream investigations, submits an estimate of their cost, and also suggests the order in which drainage works may most profitably be developed.

The estimated cost of the proposed improvements is $10,687,000, or about $7 per acre. "Before any considerable amount of money is spent in drainage improvements, a complete drainage survey of the district should be made and a plan for the improvement be devised." Suggestions for making such a survey and forming a drainage organization are given, as well as available data regarding the rainfall of the region.

The drainage situation in the lower Rio Grande Valley, Texas, L. L. Hidinger (*U. S. Dept. Agr., Office Expt. Stas. Circ. 103, pp. 36, figs. 2, map 1*).—This report on the lower Rio Grande Valley, which when first settled gave promise of large crops but markedly deteriorated after the first year or two of cultivation because of seepage and the rise of alkali, discusses the soils, crops, rainfall, alkali in the region, the movement of water and alkali in soils, the allowable salt content of irrigation water, the rise of ground water in soils, and methods of reclaiming soils. A plan for the drainage of a single plantation is included.

The general conclusions drawn as to the situation are as follows:

"There is not an excessive amount of alkali in the most of the lower Rio Grande Valley soils if it is kept distributed, but if allowed to become concentrated by seepage and evaporation there is sufficient in nearly all of the soils to prevent plant growth. . . .

"The Rio Grande water is a good irrigation water. Any large amount of alkali concentrated by its use will necessarily come from the soil.

"It is very probable that in time the soils of the lower Rio Grande Valley will fill up with ground water near enough to the surface to cause the alkali to concentrate in harmful quantities, and that extensive drainage works will be required.

"In general, the drainage of the lower Rio Grande Valley lands can best be accomplished by parallel lines of tile with or nearly with the slope, together with an intercepting ditch along the upper side of the affected tract if the water comes from a canal or higher lying irrigated lands. Where the seep spot is small and a gravity outlet is not available it will be necessary to pump the drainage water. This method will probably be necessary until enough land has been swamped to force the construction of expensive outlet ditches. These outlet ditches will be necessary after a time and should be constructed as soon as districts can be organized."

The selection and installation of machinery for small pumping plants, W. B. Gregory (*U. S. Dept. Agr., Office Expt. Stas. Circ. 101, pp. 40, figs. 22*).—This circular, continuing work previously noted (E. S. R., 20, p. 885), is intended primarily for persons who intend to install plants too small to warrant the employment of a consulting engineer. It presents and summarizes data as to the various types of pumps used for the purpose, dynamic head or "head on pump," losses in pump installations, foundations for pumps, cost of centrifugal pumps, types of engines, points to consider in choosing an engine, foundations for engines, types of boilers, setting for boilers, boiler fittings, and heaters. The data on many of these points are presented both in tables and graphically.

Delivery of water to irrigators, F. Adams (*U. S. Dept. Agr., Office Expt. Stas. Bul. 229, pp. 99, figs. 9*).—In this bulletin are described the systems adopted for distributing water to irrigators on about 50 irrigation systems in California, Colorado, Wyoming, Montana, Utah, Idaho, Washington, Oregon, Nevada, Arizona, and New Mexico. Each system is discussed individually and a summary follows which deals with plans of delivery, delivery force, rules and regulations, records and forms used, suggested water charges, cost of water delivery, lateral organizations, and the measurement of water.

Of the 3 general plans of water delivery, that of continuous flow is deemed unsatisfactory under ordinary conditions; that of rotation is found the most generally accepted and in nearly every way the most satisfactory plan now in use; and that on demand can be used with advantage where reservoirs are the chief source of supply, where the available supply can be closely predicted, and where the land under irrigation is closely settled. The desirability of printed rules and regulations and the keeping of permanent records is pointed out. The annual cost of water delivery per acre on 13 typical systems where this included delivery to individuals was 41.5 cts. per acre, and on 4 typical canals where it included only delivery to the laterals 7.5 cts.

Duty of water investigations, G. H. True (*Nevada Sta. Bul. 72, pp. 26–28*).—During the irrigating season of 1908 a study was made in cooperation with the irrigation investigations of the Office of Experiments of this Department, as to the cost of maintenance and duty of water under the systems used in 5 canals and ditches. The results are summarized by the following table:

Principal results of duty of water investigations.

Name of canal.	Area irrigated.	Total value of crops.	Value per acre of crops.	Depth of water.	Return per acre-foot of water.	Cost of maintenance per acre.
	Acres.	*Dollars.*	*Dollars.*	*Feet.*	*Dollars.*	*Dollars.*
Steamboat	4,759	104,473.00	21.95	4.22	5.57	1.05
Orr	3,007	85,320.00	28.04	6.87	4.32	0.74
Last Chance	3,146	49,250.00	22.90	5.09	4.79	1.14
Truckee Meadow	1,866	43,397.00	23.30	5.03	4.76	0.35
English Mill	455.5	15,901.50	34.90	9.39	3.56	0.28

The results of experiments with beardless barley, White Australian wheat, Siberian oats, Kubanka wheat, alfalfa, and mangel-wurzels are presented in tables. The data reported in each case include the number of irrigations, the depth of water applied, the precipitation, and the yields per acre and per acre-foot of water.

Bitumens and their essential constituents for road construction and maintenance, P. Hubbard (*U. S. Dept. Agr., Office Pub. Roads Circ. 93, pp. 16*).—This publication presents in condensed form a description and discussion of various bituminous materials at present in use in road construction and maintenance. The various materials are arranged alphabetically.

RURAL ECONOMICS.

Bibliography of economics for 1909, J. L. Laughlin et al. (*Chicago, 1910, pp. XIII+282*).—In this volume, which consists of an assembling of bibliographies appearing in the *Journal of Political Economy* from February, 1909, to January, 1910, inclusive, there are extensive bibliographies on agriculture and the land problem, transportation, labor conditions and wages, insurance, and other subjects having a more or less direct or indirect bearing on the agricultural industry.

Concerning intensive culture and the profitableness of agriculture, T. Brinkmann (*Fühling's Landw. Ztg., 59 (1910), No. 14, pp. 465–489, figs. 2*).—According to the author, the three factors of intensive culture which have a direct bearing on the profitableness of agriculture are "nature," which includes both land and climate, market relations, and the personality of the farmer. Illustrations are given of a large number of farms managed under different degrees of intensive culture, situated in different parts of Germany, and operated under various systems of management involving greater or less expenditures of capital and labor. The operation of farms under these conditions is tabulated as to expenditures per hectare, gross yields, and net profits, and discussed in detail as to the relation of culture to profitableness.

The general conclusion is reached that the farm which is operated in accordance with the nature of the soil, conditions of climate, and market relations will give the highest net profits; that the whole problem of business organization in agriculture consists in a proper balancing of live-stock production with other forms of agricultural production; and that the operation of a farm on the soundest economic basis must take into consideration the fact that animal production is the keystone to successful and profitable farming in Germany at the present time.

Congress of agricultural mutual aid societies, H. SAGNIER (*Jour. Agr. Prat., n. ser., 20 (1910), No. 39, pp. 411–414*).—This is a summarized account of the proceedings of the fourth congress of mutual agricultural insurance, credit, and cooperative societies held at Rouen from September 15 to 18, 1910. The progress of agricultural mutual aid in France is indicated by the papers presented, and the resolutions of the organization to the government relate to securing legislation more favorable to the future development of such organizations.

Village banks in Holland, S. LISTOE (*Daily Cons. and Trade Rpts. [U. S.], n. ser., 1 (1910), No. 11, pp. 138–141*).—This article describes the origin and development of agricultural credit banks in Holland, of which there were more than 600 in existence in 1910, based on the Raiffeisen plan.

Information is given on the organization and management of the local banks and on their obligations when connected with the central bank at Utrecht. The rate of interest allowed to depositors by the central bank is 3¼ per cent and the charges for advances 4¼ per cent. It is said that the whole arrangement of the Raiffeisen banks indicates an earnest effort to promote the interests of the members, self-interest and profit seeking being excluded.

Agricultural labor, W. L. SUMMERS ET AL. (*Jour. Dept. Agr. So. Aust., 14 (1910), No. 3, pp. 285–288*).—This is a paper and discussion dealing with the agricultural labor problem in South Australia.

It is recognized that the modern farm laborer is a skilled worker, and as means to supply the demand for competent laborers throughout the country it is suggested (1) that the agricultural bureau cooperate with the labor bureau for ascertaining the call for laborers in different parts and locating the workers to the best advantage, and (2) that training farms be established for city boys, where they could learn the use of farm implements and be trained in the handling and feeding of stock to make their services of value to farmers and other producers.

Students as farm laborers, E. BIPPART ET AL. (*Mitt. Deut. Landw. Gesell., 25 (1910), No. 39, pp. 571–574*).—This article discusses the advisability of employing students as farm hands in Germany during the vacation season.

The opinion of E. Bippart is that students from the city colleges and universities could be profitably employed on farms during the summer since their intellectual training enables them to learn readily the different lines of farm work. In support of his opinion he quotes an article by G. Dehlinger, who gives his experience with 6 students during 4 vacation seasons, showing that they were not only hard workers but soon relieved the employer of the care of machinery and of other similar duties. The methods of training the students and of regulating their wages according to the amount and character of work performed are described.

An answer by E. Langenbeck is included, the latter being inclined to favor the employment of only agricultural students or those who, having had experience of farm life in earlier years, have become students in city colleges and universities. The general run of city students, it is believed, is hardly sufficiently adapted to the strenuous conditions of farm life, work, and wages to be profitably employed during the summer vacation in agricultural pursuits.

Statistical yearbook of Belgium, 1909 (*Ann. Statis. Belg., 40 (1910), pp. LXXV+459, dgm. 1*).—This volume contains detailed statistics relating both to agriculture and commerce for the year 1909. Statistics on agriculture are presented and discussed as to the population, wages of agricultural laborers, extent and division of agricultural lands, acreage in crops, number and size of holdings, number and size of proprietary and rented holdings, crop and live stock production, land values, prices of agricultural products, etc.

Agricultural population and production in Algeria, P. MEURIOT (*Jour. Soc. Statis. Paris, 51 (1910), No. 10, pp. 397–402*).—This article points out the predominance of agriculture in the economic life of Algeria, as shown by the statistics of the census of 1906.

Of a population of 5,258,000, no less than 3,632,000, or 70 per cent, depend upon agriculture for a living. Comparisons are made between the number of native and foreign proprietors, farmers, renters, and laborers, their acreage under crops, ownership and number of live stock, amount of capital invested, and the kinds and amounts of crops raised by native and European farmers. The advantage of modern scientific over native methods is shown by the increased returns per hectare secured by Europeans.

The American farmer: His past, present, and future, E. B. DORSETT (*Penn. Dept. Agr. Bul. 193, pp. 96–100*).—This paper describes the influence wrought by the farmer in the past and present development of this country, and points out what agricultural education is likely to do, not only in producing a race of scientific farmers but also in establishing the government on a more economic and equitable basis.

Good farming and attractive country homes, W. J. SPILLMAN ET AL. (*Spokane, 1910, pp. 162, figs. 61*).—This volume consists of a compilation of letters selected from a large number submitted by farmers and their wives for prizes which were awarded for the best letter or plan on the following topics: (1) How to make farm life more attractive; (2) how to farm 160 acres of nonirrigated land; (3) how to farm a 10-acre irrigated tract; and (4) how to plan a model farm house. The letters and plans constitute a series of practical suggestions on farm management and farm sociology which are published in anticipation that they will be useful to farmers in all parts of the country and helpful in the solution of important farm problems.

The farmer and the cost of living, B. F. YOAKUM (*Saturday Even. Post, 183 (1910), No. 6, pp. 10, 11, fig. 1*).—This is a discussion, by the chairman of the St. Louis and San Francisco Railroad Company and allied lines, of economic problems relating to the production, distribution, and cost of food supplies.

The author believes that the farmer should be aided in the adoption of better agricultural methods to increase production and a better business system through cooperation to increase his profits and reduce the cost of living to the consumer. Road improvement to facilitate the transportation of goods to the railroads is advocated to prevent one of the greatest economic wastes in the distribution of agricultural products. The sum received by farmers for eggs, coffee, rice, cabbages, onions, milk, potatoes, meat, and poultry in 1909 was $274,289,000, while the price paid by consumers for the same goods in New York was $464,147,000. After paying the freight on these goods of $25,045,000, the expenses and profits of the middlemen were $164,813,000. These figures are quoted to show that it is not the prices farmers are getting nor high railroad freight rates which make living so expensive, but the expense of getting products to the railroads and the profits of wholesale and retail dealers.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 13 (1911), No. 1, pp. 1–8, dgms. 2*).—Statistics on the condition of crops in the United States and foreign countries, the farm values and range of prices of agricultural products, and monthly receipts of eggs and poultry in the leading markets of the United States are presented and discussed. The annual report of the Bureau of Statistics for the year 1909–10, continued from the December supplement (E. S. R., 24, p. 292), contains data on the purchasing power of farm products in 1899 and 1909 as measured in terms of general products purchased by farmers, from which it appears that the purchasing power of one acre has increased about 54 per cent during this period.

AGRICULTURAL EDUCATION.

Report on the distribution of grants for agricultural education and research (*Bd. Agr. and Fisheries [London], Rpt. Agr. Ed. and Research, 1908–9, 1909–10, pp. XVII+132*).—This report includes a general report on the work of the department for 2 years, a list of grants awarded in these years, discussions concerning the arrangements with the Board of Education, the development and road improvement funds act (E. S. R., 24, p. 201), and state aid for research, and appendixes dealing with these matters in detail.

According to this report the grants awarded by the Board of Agriculture and Fisheries for agricultural instruction in England and Wales amounted in 1908–9 to $58,320, and in 1909–10 to $59,778. There were also special grants for experimentation and research amounting in 1908–9 to $4,423, and in 1909–10 to $2,916. Although grants for experimentation have been given for a number of years, not until 1908–9 was there any grant to an institution for research work, when $972 was allotted to the University of Cambridge for cereal breeding investigations.

The relations between the Board of Agriculture and Fisheries and the Board of Education with reference to the promotion of agricultural education in England and Wales have been defined by a "memorandum of arrangements" between these departments. According to the terms of this memorandum, the purpose of which is to prevent overlapping or duplication of work in agricultural education, the Board of Agriculture and Fisheries will hereafter distribute all grants to institutions giving instruction to students in advanced courses in agriculture, and to institutions restricted to one special phase of the subject, such as forestry, dairying, or cider making, the main purpose of which is to prepare competent instructors in that phase of agricultural work, and the Board of Education will distribute all grants in aid of other forms of agricultural education. In the case of farm schools having farms and experiment stations in connection with them, the Board of Agriculture and Fisheries will render the necessary government supervision and aid for the farms and stations and the Board of Education that for the educational work of these schools. To aid in correlating the work of the 2 boards an interdepartmental committee has been provided for, as previously noted (E. S. R., 23, p. 298).

Agricultural education, J. G. SCHURMAN (*N. Y. Dept. Agr. Bul. 14, pp. 137a–149a*).—The author considers the passage by Congress of the land-grant act of 1862 to be the fifth great epoch in the history of university education. He traces the development of the land-grant colleges with reference to their agricultural and engineering courses.

Aids to agricultural advancement in the Middle West, E. DAVENPORT (*N. Y. Dept. Agr. Bul. 14, pp. 95a–116a*).—The author recommends as a rational system of agricultural education: (1) Courses of collegiate grade, in which approximately one-half of the work is given to technical agriculture of the highest quality, such courses to be offered in the state college and as many other institutions of higher learning as will honestly undertake to serve agriculture in a large way; (2) courses in technical agriculture, to be added to all high schools and other institutions of secondary grade that have an agricultural constituency, and which should occupy one-fourth of the students' time and be taught from the professional basis; and (3) nature study, to be so taught in the grades and in the country schools that agriculture may be developed naturally out of the undifferentiated field, and that this development should begin when economic sense commences to appear in the child, and develop as he develops.

The opportunity of the California high school, E. HYATT (*Sacramento: Dept. Ed., 1910, pp. 21*).—This pamphlet includes brief statements concerning boys' and girls' clubs and the educational opportunity of the California high school with reference to the development of the leading agricultural interests of California, a description of the Stockton high school plan for agricultural education, and a bibliography of considerable length containing references to books and discussions concerning industrial education in general, industrial education in high schools, trade schools, and elementary schools, and agriculture in high schools and elementary schools.

The Stockton high school plan, which goes into operation in 1910–11, includes a two-year course in agriculture, to meet the needs of the prospective farmer, and a four-year course to include not only basic studies on the various phases of agriculture, but also considerable work leading directly to the local agricultural problems. There will also be courses in home economics for girls and short courses for farmers. The director in charge of this work will teach not more than one-third of his time and devote the remainder to a study of the agricultural problems in the farming area tributary to Stockton. He is expected to become a sort of traveling teacher and advisor for the farmers, hold county and district institutes of teachers, farmers, and students, have charge of work in nature study, elementary agriculture, and school gardening in the elementary schools of Stockton, engage in experimental work in cooperation with other agricultural agencies, and make arrangements with farmers for field studies to be made by students of the high school. Leaflets bearing on the agricultural problems of the district will be published and distributed.

Agricultural schools, D. J. CROSBY (*N. Y. Dept. Agr. Bul. 14, pp. 159a–169a*).—The author traces the development of secondary instruction in agriculture in the United States, describes the different types of schools teaching secondary agriculture, and discusses the function of agriculture in public high schools and the functions of the special agricultural school, these being briefly outlined as follows: To stimulate the general introduction of agriculture into the ordinary high schools, to aid in the preparation of teachers for the rural schools, to serve as educational connecting schools between the public elementary schools and the agricultural colleges, to serve as schools to which boys who have chosen to become farmers may elect to go for thorough and effective preparation for their life work, to relieve the agricultural colleges of much of the secondary work they are now compelled to do, and to serve the farming community more intimately and sympathetically than the agricultural colleges can do and more effectively than the public high schools can do.

Experiments with plants and soils in laboratory, garden, and field, F. E. EDWARDS (*California Sta. Circ. 58, pp. 35*).—The author of this series of 50 exercises is instructor in agricultural chemistry in the California Polytechnic School, and has taught elementary agriculture in the way that he here describes it to students coming to his classes from the eighth grade. The exercises are intended for the first year of agriculture in high schools. They are arranged in two general groups, the first dealing with the plant and its work, and the second with the soil and its relation to plants. Lists of reference books, apparatus, and chemicals suitable for the work outlined are appended.

Children: Their care, training and happiness as future citizens, J. J. Kelso (*Ontario Dept. Agr. Bul. 186, pp. 20, figs. 10*).—This explains the children's protection act of Ontario and the work that is contemplated under its provisions.

College extension in agriculture, edited by J. Hamilton (*U. S. Dept. Agr., Office Expt. Stas. Bul. 231, pp. 86*).—This bulletin contains 11 addresses delivered at a series of conferences on college extension in agriculture held at the Graduate School of Agriculture, Ames, Iowa, in July, 1910, and previously noted (E. S. R., 23, p. 407).

List of state directors of farmers' institutes and farmers' institute lecturers of the United States, J. Hamilton (*U. S. Dept. Agr., Office Expt. Stas. Circ. 105, pp. 13*).—A revision of the circular previously noted (E. S. R., 15, p. 418).

Organization lists of the agricultural colleges and experiment stations in the United States, Mary A. Agnew (*U. S. Dept. Agr., Office Expt. Stas. Bul. 233, pp. 100*).

MISCELLANEOUS.

Twenty-second Annual Report of Colorado Station, 1909 (*Colorado Sta. Rpt. 1909, pp. 66*).—This contains the organization list, a report of the director discussing the function, work, and needs of the station, a financial statement for the fiscal year ended June 30, 1909, a list of the exchanges of the station, and departmental reports, of which that of the field entomologist and the horse breeding investigations are abstracted elsewhere in this issue.

Annual Report of Nevada Station, 1909 (*Nevada Sta. Bul. 72, pp. 58, pls. 3*).—This contains the organization list and reports of the board of control, the director, and heads of departments. The report of the director includes a financial statement for the fiscal year ended June 30, 1909. The experimental work reported in the departmental reports is abstracted elsewhere in this issue.

Twenty-third Annual Report of Vermont Station, 1910 (*Vermont Sta. Rpt. 1910, pp. XXIV+744+[6]+745–751, pls. 22, figs. 109*).—This contains the organization list, a brief announcement concerning the station, a financial statement for the fiscal year ended June 30, 1910, a report of the director on the publications and work of the station, and reprints of Bulletins 144–151, previously noted, and of Bulletins 152–154 and Circulars 4 and 5, abstracted elsewhere in this issue.

Concerning Bulletins 145, 147, 148, and 150 (*Vermont Sta. Circ. 5, pp. 2*).—This contains brief popular summaries of bulletins previously noted.

A neglected field in photomicrography, S. B. Doten (*Nevada Sta. Bul. 73, pp. 9–15, pls. 4, fig. 1*).—An apparatus is described for photographing opaque objects as they appear under the simple microscope, and its use is discussed. The mechanism is especially adapted to the amplification of the image to exact magnifications of from ½ of 1 diameter to 15 diameters.

"The construction of this vertical camera stand lies well within the powers of any ordinary skillful workman. . . . The essential features of construction are of the simplest: merely a heavy base, a standard free from vibration, a carriage that may be moved up and down the upright standard, and a camera with detachable front and long bellows connected by an adapter with the horizontal arm of the dissecting microscope."

NOTES.

Kansas College and Station.—Appropriations aggregating $985,000 have been made by the legislature for the ensuing biennium. Of this amount $450,000 is for maintenance, $45,000 for the station, $75,000 for extension work, $46,300 for the Fort Hays substation, $7,500 for the Garden City substation, $125,000 for building and equipping a wing of the agricultural building to accommodate the departments of animal husbandry, plant production, grain products, and farm mechanics, and the remainder for increased equipment in various departments, minor improvements, and miscellaneous expenditures. The law relating to the inspection of feeding stuffs was also revised and the fees made larger, thereby increasing the revenues of the college.

A bill to consolidate the management of the state university, the agricultural college, and the state normal school by the appointment of a single salaried commission was enacted by the legislature but vetoed by Governor Stubbs.

Atsushi Miyawaki, assistant in experimental dairying, has resigned to teach dairying and agriculture at the college of agriculture of Tohoku Imperial University, Sapporo, Japan.

Kentucky College and Station.—The first dairy special train to be sent out in Kentucky made a 5-day trip beginning March 6. Demonstrations were given of improved dairy stock, machinery, feeding stuffs, and dairy products.

Robert Graham has been appointed veterinarian in the station.

Massachusetts College.—The short courses have been unusually well attended this winter, many being turned away because of lack of accommodations. Farmers' Week also drew a record-breaking attendance. A Polish-American farmers' day was held March 31, lectures being given on onion growing, cattle feeding, American citizenship, the maintenance of health, and similar topics.

Recent appointments include John A. McLean, formerly of the Mississippi Station, as associate professor of animal husbandry, John C. Graham as associate professor of poultry husbandry, and Dr. Guy Chester Crampton, since the summer of 1910 professor of zoology at Clemson College, as associate professor of entomology.

Missouri Station.—C. E. Wilson has been appointed assistant in veterinary science.

Montana College and Station.—The legislature just adjourned made substantial increases in the appropriations, the aggregate provided for the ensuing biennium being $274,295. Of this $102,295 is for maintenance of the college, $42,500 for the station, $10,000 for the dry farming and horticultural substations, $36,000 for demonstration work in dry farming, $60,000 for an engineering building, $10,000 for greenhouses, and $13,500 for barns, implements, and other improvements. In addition the station chemist was designated as state chemist in food and health matters, with an appropriation of $1,500 per year, and a dairy inspector and instructor, to be located at the college, was authorized with an appropriation of $3,000 per year.

The second annual horse school was held January 23–28, with an attendance of about 200 men and boys. Lectures on the feeding, breeding, and management of horses, common diseases and their treatment, and scoring and judging were given. The first horse judging contest in Montana completed the program.

New Jersey Stations.—Director E. B. Voorhees has been given 6 months' leave of absence, beginning March 1, on account of protracted illness. Dr. J. G. Lipman has been made acting director of the station during this period, vice President W. H. S. Demarest, who has served as acting director during Dr. Voorhees' illness.

New Mexico Station.—A very successful demonstration day for farmers was held January 28, with an attendance of over 200. Many favorable comments on the affair were made by the press of the State, and it is planned to repeat the occasion.

The department of agronomy is continuing the studies of the duties of water, the water-holding capacity of Mesilla Valley soils, and the effect of the soil texture on the development of the crop. With field crops, work is being centered on studies with wheat and alfalfa as to the time of seeding, fertilizer requirements, and varieties. Further studies are being made with regard to nonsaccharine sorghum and cotton and additional work is contemplated with beans.

The irrigation department is studying the economic value of the use of two or more wells attached to one pump.

New York State Station.—Godfrey L. A. Ruehle, assistant in chemistry at the University of Washington, has been appointed assistant bacteriologist, and has entered upon his duties.

Ohio State University and Station.—Two courses in agricultural education are announced by the college of agriculture for the summer session, June 19 to August 11. One course is especially intended for superintendents, principals, teachers, and prospective teachers of agriculture in high schools, while the other course is designed to meet the needs of the elementary and rural teachers, who are, under a recent law, required to teach this subject in their schools.

Dean H. C. Price and Prof. W. R. Lazenby have been granted leave of absence for next year, the former for study in one of the German universities and the latter for travel and the study of forestry in Europe and South America.

Recent appointments in the station include Ernest J. Riggs as assistant horticulturist, Ben Hur Kepner as assistant agronomist in charge of milling and baking tests, and Charles McIntire as field assistant in the management of county experiment farms.

Oregon College and Station.—Appropriations for the ensuing biennium aggregate $681,500. Of this $273,500 is for new buildings and improvements, among the items being $36,600 for a horticultural wing of the agricultural building, $29,700 for a dairy building, $14,600 for a farm mechanics building, $7,600 for a stock judging pavilion, $100,000 for equipment, improvements, and repairs, $25,000 for the purchase of land, and $15,000 for books for the library.

The appropriation for maintenance of the college is nearly doubled, being made $150,000 per annum. The station receives $25,000 per annum, of which $15,000 is for the investigation of crop and fruit pests and diseases and horticultural problems. There is also granted $21,000 per annum for substations, and $2,500 per annum for farmers' institutes. The various maintenance appropriations were also made permanent, continuing from year to year, at the amounts granted, without further legislation.

W. H. Lawrence, superintendent of the western Washington substation at Puyallup, has been appointed to a fellowship established by the Hood River Fellowship Association, an organization incorporated by a number of fruit growers of that region. The work is to be performed in the Hood River Valley, and will be devoted to orchard diseases and like problems.

Pennsylvania Institute of Animal Nutrition.—Dr. H. P. Armsby has been elected a member of the Royal Society of Arts of Great Britain. J. H. Hamilton, a graduate of the Oklahoma College, has been appointed assistant in animal nutrition, vice F. W. Christensen, whose appointment at the New Mexico Station has been previously noted.

Porto Rico Sugar Planters' Station.—The location of this station at Rio Piedras, about 10 miles south of San Juan, is announced. Dr. Fritz Zerban, assistant director and chemist of the agricultural experiment station at Tucuman, Argentina, since June, 1909, has been appointed chemist.

Texas Station.—E. C. Carlyle and J. T. Auten have resigned as assistant state chemists, and M. B. Gottlieb and L. C. Ludlum have been added to the staff.

Utah College.—*Science* states that under a recently enacted law 28 per cent of the income derived from a state tax of 4½ mills is to be available for the maintenance of higher education in the State. Of this amount 28.34 per cent is to be allotted to the agricultural college, 64.43 per cent to the state university, and 7.23 per cent to the state normal school.

Vermont University and Station.—At the beginning of the next college year major courses in forestry, to occupy 40 per cent of the time, will be offered to junior and senior students of the college of agriculture. Bernard A. Chandler, who will graduate from the Yale Forest School in June, has been appointed instructor in forestry, to begin work in September.

The third annual Farmers' Week, February 20–24, drew an attendance of over 425 to the 64 addresses and 16 demonstrations presented. The sixth conference of the schools of Vermont, held at the university March 9–12, gave special prominence to the teaching of agriculture and home economics in Vermont schools, a symposium being held on each subject.

It is planned to extend the scope of the department of home economics next year, and Miss Josephine A. Marshall has been appointed instructor.

West Virginia Station.—The death by drowning is noted of Charles M. Gifford, assistant in plant pathology. He was a 1910 graduate of the University of Vermont, and 23 years of age.

Wisconsin University.—Arrangements have been completed with the owners of 12 "accredited" farms in the State whereby employment and practical instruction will be provided for students who have satisfactorily completed two years of their college course. The farms have been selected on the basis of the success and progressiveness of their owners and their ability to instruct students. The work will be under the general direction of the department of farm management.

Science states that a school for forest rangers to consist of a two-year course, the winters at the university and the summers in practical work on the state forest reservations or in lumbering operations in the field, is contemplated. It is expected that much of the instruction will be given in existing departments of the colleges of agriculture and engineering.

Wyoming University and Station.—A bill granting to the university for maintenance and buildings the proceeds of a half mill tax to the limit of $85,000 annually has been passed by the legislature. A $4,000 appropriation for farmers' institutes was vetoed by the governor, making necessary the suspension of this work during the ensuing biennium.

A section of land near Laramie has been purchased for demonstration and experimental purposes. LeRoy D. Swingle has been appointed research parasitologist in the station.

Death of Dr. S. A. Knapp.—Dr. Seaman A. Knapp, widely known throughout the South in connection with the Farmers' Cooperative Demonstration Work of this Department, died in Washington, D. C., April 1, at the age of 77 years.

Dr. Knapp was a native of Essex County, New York, and educated at Union College. His early work was as a teacher and administrator in the Fort Edward

Collegiate Institute, Ripley Female College, and the Iowa State College for the Blind.

In 1879 he became professor of agriculture in the Iowa State College of Agriculture and Mechanic Arts, and continued in this capacity until 1886. From 1883–4 he also served as president of the institution.

Dr. Knapp's services for this Department began with surveys of agricultural conditions in foreign countries, Japan, China, the Philippines, Porto Rico, Ceylon, Burma, and Hawaii being visited at different periods. In 1902 he organized the unique campaign to minimize the ravages of the boll weevil by the demonstration of improved cultural methods and the introduction of diversification of crops. This work steadily increased in scope and popularity until in 1910 the Department was expending over $250,000 annually for the purpose. This was supplemented by $113,000 from the General Education Board, and $70,000 from state and individual sources, and a force of about 500 men was engaged under his supervision, which despite his advancing years was actively maintained in the work.

Dr. Knapp will be especially remembered as the exponent of the demonstration method of disseminating results, but it should also be noted that he was an early advocate of federal aid to experimentation in agriculture. In recognition of his services to agriculture the degree of D. Sc. was conferred upon him by the Iowa State College in 1909. Upper Iowa University and Baylor University had previously given him the degree of LL. D.

Bradford Knapp, his son, who has been associated with the farmers' cooperative demonstration work for some time, has been appointed special agent in charge to succeed him.

Recent Federal Agricultural Legislation.—The principal legislation during the recent session of the Sixty-first Congress, aside from the agricultural appropriation act, a summary of which appears on page 401 of this issue, was the measure approved March 1, and commonly known as the "Appalachian Forest Reserve" Act, since in its original form it definitely provided for reserves in this region, and was discussed with special reference to the conditions in the White Mountains and Southern Appalachian System.

Under the terms of this act the States are authorized to cooperate with each other and with the Federal Government for the purpose of conserving the forests and water supply. The Secretary of Agriculture is directed to locate suitable lands at the headwaters of navigable streams, and following a report from the Geological Survey that they will promote or protect the navigation of these streams, and the approval of the National Forest Reservation Commission and of the legislatures of the States in which the lands are situated, he may purchase these lands in the name of the United States at prices fixed by the commission. An appropriation of $2,000,000 annually until July 1, 1915, is made for this purpose. Reservation of minerals and merchantable timber may be made to the seller at the time of purchase.

The Secretary of Agriculture is further authorized to administer lands so acquired as national forests, in much the same way as those already so designated. Five per cent of all revenues derived from any such forests is to be returned to the State for the benefit of the public schools and roads of the county in which it is located.

An appropriation of $200,000, which is available until expended, is also made to enable the Secretary to cooperate with the States, if desired, in the protection from fire of forested watersheds of navigable streams irrespective of ownership. In such cases the States must establish a system of forest fire protection and expend for it an amount equal to that allotted from the Federal Treasury.

The National Forest Reservation Commission which is established by the act consists of the Secretaries of War, Interior, and Agriculture, and of two Members each of the Senate and House of Representatives. The Members of Congress who have been designated are Honorables Jacob H. Gallinger, of New Hampshire, and John Walter Smith, of Maryland, from the Senate, and Willis C. Hawley, of Oregon, and Gordon Lee, of Georgia, from the House. An appropriation of $25,000 annually is available for the expenses of the commission.

Other legislation enacted included the adoption of a resolution providing for the reprinting of 100,000 copies each of the special reports on the diseases of the horse and of cattle. In the Indian appropriation act the usual appropriation of $5,000 for conducting experiments at the Indian school and agency farms as to the adaptability of various crops was continued. A lump fund appropriation of $6,000 was made to the Bureau of Education for the first time for investigations of rural education, industrial education, and school hygiene.

The appointment of a salaried delegate to the International Institute of Agriculture was also authorized, for the first time, in the diplomatic and consular appropriation act, $3,600 being allotted in addition to $4,800 as the quota of the United States for the support of the institute. A deficiency appropriation of $10,000 for the payment of expenses of delegates to the institute in 1911 was likewise granted.

Bequest for Agricultural Advancement in Hardwick, Mass.—A bequest of $100,000 to the town of Hardwick, Mass., to further agricultural, horticultural, and rural interests, has recently become available from the estate of the late Calvin Paige, a former resident of the town. A portion of this fund has been expended in the purchase of two parcels of land. Only the income from the bequest is available for maintenance, and it is proposed to utilize this in carrying on demonstration work illustrative of experiment station results along lines adapted to local needs. There is an old apple orchard of 5 acres on one of the tracts purchased, which will receive attention as to pruning, cultivation, spraying, etc., and it is also hoped to engage in forestry work. Charles O. Flagg, formerly director of the Rhode Island Station, has accepted the position of superintendent of the enterprise.

National School of Agriculture, Montpellier, France.—A letter recently received from Dean Hunt, of the Pennsylvania College and Station, now on leave of absence in Europe, contains an account of the recent erection of a monument at this school in recognition of the work of the late Gustave Foëx, a former president of the school, in improving the culture of grapes in Europe. The monument was erected by a popular subscription of about $3,000, contributed by people of France, Austria, Italy, Egypt, and Greece, and symbolizes the encouragement rendered to European grape culture by the introduction of American grapes. The dedication of the monument is to take place this spring.

Normal School Agriculture.—The State Normal and Training School at Cortland, N. Y., announces agricultural courses for teachers beginning with the fall of 1911.

Two courses will be available, (1) a two-year course open to men at least 16 years of age who have had farm experience and the necessary training to admit them to the regular normal school courses, and (2) a one-year course open to young men who are high school graduates or have had equivalent education, have had farm experience, hold a life certificate valid in New York, and have had at least one year of successful experience in teaching. Both courses are primarily scientific and agricultural, but the two-year course includes one unit of psychology, one of the history of education, two-fifths of a unit of school economy, one unit in manual training, one of grammar methods, and two each of observation and teaching. The work in science and agriculture, which is common to both courses, includes agricultural physics, farm mechanics, horticulture, farm crops, animal husbandry, dairying, farm management and farm practice, botany, entomology, bacteriology and plant pathology, advanced science methods, and chemistry. The purpose of the courses is to train teachers for high school work in agriculture under the New York state law giving state aid to schools organizing departments of agriculture, home economics, and manual training.

National Corn Exposition.—The exposition held at Columbus, Ohio, January 30 to February 11, was distinctly a national event. Selected exhibits of corn from state corn shows were in competition from 35 States, and there were also extensive educational exhibits from this Department and 25 experiment stations, and of agricultural machinery, cereal food products, and dairy equipment. Daily programs of lectures, demonstrations, and conferences, addressed by speakers of national reputation, were held and special days were set apart, such as live stock day, a national dairy day, a conservation day, and a 4-day rural life conference. The American Breeders' Association held its annual meeting during the exposition.

Miscellaneous.—Dr. Pehr Olsson-Seffer, director of the Tezonapa Botanical Station, has been appointed professor of botany at the National University of Mexico. Lectures will be given on the history of botany, evolution of plants, and ecological plant geology, and courses in plant physiology will be continued at the Tezonapa Botanical Station. Dr. Olsson-Seffer has also recently accepted the position of government botanist, in charge of the botanical section of the Mexican Department of Agriculture and of the bureau of forestry.

A recent number of *Revue Horticole* states that the Royal College of Science and Technology, London, decided recently to establish a chair of vegetable physiology and pathology and has called Prof. Frederic Czapek, of the University of Prague, to the position.

By the will of Sir Francis Galton, who died January 17 at the age of 88 years, his residuary estate, valued at about $180,000, has been bequeathed to the University of London for the establishment of a Galton Professorship of Eugenics. The desire is expressed in the will that Prof. Karl Pearson be offered the position.

A recent number of the *Deutsche Landwirtschaftliche Zeitung* states that Dr. Kurt Teichert, for 4 years director of the Dairy Institute at Memmingen, has accepted the directorship of the Würtemberg Institute for Experimentation and Instruction in Cheese Making at Wangen, Allgäu, which is to be opened June 1.

Dr. Wilhelm Wagner, teacher of agriculture in the Agricultural Winter School, Zerbst, Germany, has accepted the position of agricultural lecturer at the German-Chinese College, Tsingtau, Kiaochow.

The *Wiener Landwirtschaftliche Zeitung* of January 18 states that on January 9 Dr. Joseph Ritter v. Popp was succeeded as royal imperial minister of agriculture of Austria, by Adalbert Freih. v. Widmann.

A recent number of the *Kew Bulletin* announces that F. C. McClellan, of Kew, has been appointed director of agriculture in Zanzibar, to succeed R. N. Lyne, who has been appointed director of agriculture in Mozambique.

Dr. E. J. Butler has been appointed director of the Agricultural Research Institute and College of Pusa, vice Bernard Coventry now inspector general of agriculture in India.

Dr. Theobald Smith, of Harvard University, has been appointed to the Referee Board of Consulting Scientific Experts of this Department with reference to the Food and Drugs Law of 1906, vice Dr. C. A. Herter, deceased.

O

EXPERIMENT STATION RECORD.

CONTENTS OF VOL. XXIV, NO. 6.

SUBJECT LIST OF ABSTRACTS.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

METEOROLOGY—WATER.

SOILS—FERTILIZERS.

AGRICULTURAL BOTANY.

FIELD CROPS.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

FOODS—HUMAN NUTRITION.

ANIMAL PRODUCTION.

DAIRY FARMING—DAIRYING.

VETERINARY MEDICINE.

LIST OF EXPERIMENT STATION AND DEPARTMENT PUBLICATIONS REVIEWED.

NOTE.—The price of *Experiment Station Record* is $1 per volume, and two volumes are issued annually. It may be purchased from the superintendent of documents, Washington, D. C., to whom all remittances snould be made. The publications of the State experiment stations are distributed from the stations and not from the Department.

ILLUSTRATION.

EXPERIMENT STATION RECORD.

Vol. XXIV. May, 1911. No. 6.

A vice-presidential address delivered at the Minnesota meeting of the American Association for the Advancement of Science by Prof. Charles S. Minot is well worth the careful study of every worker in science. It deals with the method of science, a topic which concerns investigation in every line, but upon which little is to be found in the literature of science to guide the student in attaining sound conceptions and standards. It has a special value for investigators in agricultural science, where the standards are less well established than in the old or pure sciences, and where the desire and the pressure to accomplish results which will have an immediate practical application often lead to haste and a departure from the general principles which should guide original scientific research.

To the active investigator the philosophical considerations of this subject and the writings of logicians are not especially attractive reading. Their treatment is tedious and often unprofitable to such as he, and makes it difficult for him to derive clear helpful impressions or inspiration. On the other hand, there seems to be no previous definite study and presentation of the principles of original research made from the standpoint of the investigator in science. The writings on the subject are scrappy and lacking in systematic treatment. Impressions of these principles are acquired largely in an indirect way, by association and by study, and find expression in the expert in a mental attitude and habit. Dr. Minot's address is a scholarly analysis of the subject, presenting the principles and motive of research in language which the man of science who is not a trained philosopher or professional logician can understand and profit by. It is both illuminating and entertaining, and from it may be gained much of the spirit of science as well as its method.

In the beginning Dr. Minot cautions against a narrow restriction of interest and appreciation to such portions of science as have an immediate application, as distinguished from the broader field of pure abstruse science. He shows that applied science is and probably always will be distinctly subsidiary to pure science. "The final justification of all scientific research is undoubtedly the power it creates for the use of mankind, but the power must be created before it can be used." This distinction is not always made, either by the public or by men engaged in investigation which aims at practical results. It is a common mistake to overlook the fact that the principles underlying an agricultural problem must first be studied before the problem itself can be solved. The fuller realization of this is a good introduction to the method of science.

Defining his subject, Dr. Minot explains that "the method of science" means more than "logic," involving far more than the logical considerations of a subject. He expresses the belief that the logical work of men of science is usually well done. "The difficulties and the majority of failures are due, it seems to me, to two chief causes—the first, inadequate determination of premises, and second, exaggerated confidence in the conclusions. If I am right, the method of science is the result of the effort to get rid of these two causes of error." And again: "There is nothing to distinguish the scientific method from the methods of everyday life except its presentation. It is not a difference in kind or quality, but a quantitative difference, which marks the work of the true scientist and gives it validity. Such being the case, a broad examination of the method of science reduces itself to the study of the general principles of securing accuracy."

The quality of scientific knowledge is illustrated by the distinction between everyday impressions and opinions, which are vague and lacking in evidence, and a scientific observation. The preservation of the evidence is the fundamental characteristic of scientific work, by which it differs radically from the practice of ordinary life. This leads to defining the method of science as "the art of making durable trustworthy records of natural phenomena," a definition which is more broad and comprehensive than at first appears, as the author shows during the course of his address.

"All science is constructed out of the personal knowledge of individual men. Science is merely the collated record of what single individuals have discovered. Accordingly, we must consider, first, the way in which the individual knowledges are recorded and collated. The process begins, of course, with the publications of the special scientific memoir in which the investigator records his original observations and makes known his conclusions." Our present standards for original memoirs have developed gradually. Harvey in his essay on the circulation of the blood, published in 1628, gives no precise data as to his observations or how often he repeated them. Authoritative and compelling as his writing appears, he offers little aid toward the repetition or verification of his results. This is true of other writers of that time and later.

In contrast to this, "in a cotemporary article we expect a presentation of all the data necessary to render subsequent verification by other observers possible. We further expect clear information as to the amount of material on which the observations were made or the number of experiments on which the work is based. In other words, a modern investigator will hardly receive consideration for his researches unless he furnishes every aid he can to facilitate criticizing and testing his results. This severe standard has been only gradually evolved, but is now stringently enforced in all departments of science, and is the response in our practice to our need of eliminating the purely personal factor. It would be advantageous if scientific authors generally viewed the obligation of providing for verification as an even more serious duty than it is esteemed at present."

Science grows by the accretion of ideas. It is based on personal knowledge. It is developed not merely by successive accumulations from a large number of workers, but also by incessant debate and mutual criticism. It is the product of collaboration, none the less actual and effective because it is unorganized. Hence, "the second step in science making, after recording the new original observations so as to make them accessible to others, is the collation of these same observations into broad general results. The aim is to eliminate the personal factor and to impart the character of impersonal absolute validity to the conclusions.

"In addition to the original memoirs science profits by a large number of publications, almost all of which are of modern, often of very recent, creation. Broadly speaking, their aim is to promote that collation which is begun in the original memoirs. Germany is the home of most of these undertakings, which are familiar to us under the names of '*Jahresberichte*,' '*Centralblätter*,' and '*Ergebnisse*.'"

Following these agencies come the handbooks, which, although more remote from the original investigation, are historically older than the annual reviews and abstract journals. While formerly one man could master his whole science and keep up with the new discoveries, to-day this is impossible, and hence the modern scientific handbook is a composite, a result of cooperation in which specialists contribute the chapters on their respective divisions of the subject.

The present method of recording and collating scientific discoveries, therefore, comprises three stages: "*First*, the record of the individual personal knowledge; *second*, the conversion of the personal knowledge by verification and collation into valid impersonal knowledge; *third*, the systematic coordination and condensation of the conclusions. . . . As soon as the discoveries are properly collated and sufficiently verified they become permanent parts of science. Many definitions of science have been given, and did time permit it might be profitable to quote some of them—but is it not sufficient to define science as *knowledge which has acquired impersonal validity?*"

Coming to the matter of records, these are recognized as being fundamental in shaping the investigation and furnishing the motif for the processes involved. Apparatus and appliances and methods have their real purpose in the securing of trustworthy records. While these records are primarily to help the original investigator, they are preserved to assist his successor in checking and repeating his work.

"Scientific records have a far wider scope than ordinary business records, which merely put down details that can not be carried in the memory. Science strives constantly after new ways of recording and demonstrating facts which would otherwise be imperfectly known, or not known at all, and at the same time of eliminating the personal factor by getting the data into a form to assist others in the work of verification." This gives to the records of investigation a new conception and importance. It leaves no uncertainty as to the obligation and responsibility for their accumulation and preservation in intelligent form.

"The progress of science is marked by the advance in the art of making research records. We all admit, in other words, that the progress of science depends partly on the perfecting of old methods, but chiefly on the invention of new ones. Despite the enormous variety in their nature and aims, all our technical methods have this in common, that their real purpose is to yield us records. Our microscopes, spectroscopes, measuring instruments, and many another apparatus have indeed their primary scope in rendering possible observations which are impossible with our unaided senses. They enlarge our field of inquiry and put precision within our reach. Yet their usefulness is conditioned upon their enabling us to make records which else would remain beyond our power. . . .

"It is remarkable that the vast majority of methods and apparatus are contrived to furnish a visible result. Sight has long been acknowledged by science as the supreme sense. . . . When we refer to the history of modern medical science we begin with the anatomist Vesalius, because he reintroduced reliance on seeing in place of reliance on the reading of old authorities."

Dr. Minot minimizes the importance of mathematics as a means of expressing the results of science. He opposes the view that no science is accurate until its results can be expressed mathematically, and while recognizing the immense value of the graphic method, he maintains that mathematics are inadequate to express the complex relations with which biology deals. "With human minds constituted as they actually are, we can not anticipate that there will ever be a mathematical expression for any organ, or even a single cell, although formulæ will continue to be useful for dealing now and then with isolated details."

But the aim of science does not stop at the accumulation of exact records. It is directed to the attainment of accurate knowledge developed from these records. This is based upon a series of assumptions: "First, that there is absolute truth, which includes everything we know or shall know; second, that we ourselves are included in this absolute truth; third, that objective existence is real; fourth, that our sensory perception of the objective is different from the reality. These conceptions constitute our fundamental maxims, and even when not definitely put in words they guide all sound scientific research. . . .

"The practical result of the four maxims has been that we further assume that all errors are of individual human origin, and that there are no objective errors. We make all the mistakes, nature makes none. To render the pursuit of new knowledge successful, our basic task is to eliminate error, or, in other words, to decide when we have sufficient proof. The elimination of error depends primarily upon insight into the sources of error, which, since methods of all sorts are employed, involves an intimate technical acquaintance with the methods, with just what they can show, with what they can not show, and with the misleading results they may produce.

"In the laboratory training of a young scientific man, one chief endeavor must always be to familiarize him with the good and the bad of the special methods of his branch of science. Not until he thoroughly understands the character and extent of both the probable and the possible errors is he qualified to begin independent work. His understanding must comprise the three sources of observational error, namely, the variation of the phenomena, the imperfections of the methods, and the inaccuracy of the observer. The personal equation always exists, although it can be quantitatively stated only in a small minority of cases.

"The history of science at large, the history of each branch of science, and the personal experience of every active investigator all equally demonstrate that the greatest source of error is in our interpretations of the observations, and this difficulty depends, it seems to me, more than upon any other one factor, upon our unconquerable tendency to let our conclusions exceed the supporting power of the evidence. Since generalization is the ultimate goal, we are too easily inveigled into assuming probabilities to be certainties and into treating theories, and even hypotheses, as definite conclusions. Each generation of investigators in its turn spends much time killing off and burying older erroneous interpretations. The business is seldom accomplished by direct attack, for error perishes only in the light of truth, as micro-organisms are said to perish suddenly when struck by ultraviolet rays. Owing to the load of false theories, we work like a mental chain gang and are never unfettered. The handicap imposed by wrong hypotheses has always impeded the growth of science."

Agriculture is rich in illustrations of false hypotheses and wrong theory. Many of these trace back to beliefs in practice which have become deep-seated traditions, and which are frequent stumbling-blocks to the investigator in his work and to the teacher in applying the results of scientific deductions. This is partly because the art developed in advance of the science and partly because of the complexity of phenomena as presented in agriculture. Farming by the moon long held sway, and to test the possibility of any foundation for these theories a series of experiments was started several years ago by a French investigator upon the effect of the moon's phases in relation to the time of planting seeds. In the science of agriculture the problems are so intricate and complicated as to give little wonder that misleading deductions have been made, and erroneous theories have temporarily been given the stamp of scientific truth. But this emphasizes the need of adequate proof, which, as Dr. Minot says, is the pivot of all research.

Judgment as to when proof is adequate varies widely, and standards of practice are not always apparent.

"It would certainly aid science if some competent philosopher should make a study of the practice of investigators in the various branches of science sufficient to render clear the general principles by which investigators decide when a new observation or a new induction is sufficiently proven. If we follow the advance of research in any particular direction, we soon realize that there is a more or less definite standard of proof, which, though never clearly formulated, is none the less insisted upon, so that any paper which does not come up to this standard is subject to unfavorable criticism. Two elements of this standard we know, the first the elimination of the recognized sources of error; second, the repetition of the observations so that the constancy of the phenomenon is assured.

"The investigator lives in an atmosphere of concentrated uncertainty, for he is convinced that at any time new data may turn up and that all generalizations are likely to require modification. We might well adopt as our cry—Incredulity toward the known; open credulity toward the unknown.

"We think of science as a vast series of approximations, and our task is constantly to render our approximations closer to absolute truth, the existence of which we take for granted. We use our approximations as best we may, treating them in large part and at least for the time being as if they were accurately true, yet meanwhile we remain alert to better them. This has long been the standard of scientific thought."

The kernel of this interesting discussion is tersely summed up in the following sentences: "The method of science is not special or peculiar to it, but only a perfected application of our human resources of observation and reflection—to use the words of Von Baer, the greatest embryologist. To secure reliability the method of science is, *first*, to record everything with which it deals, the phenomena themselves and the inferences of the individual investigators, and to record both truly; *second*, to verify and correlate the personal knowledges until they acquire impersonal validity, which means in other words that the conclusions approximate so closely to the absolute truth that we can be safely and profitably guided by them. The method of science is no mystic process. On the contrary, it is as easily comprehended as it is infinitely difficult to use perfectly, and at its best the method supplies merely available approximations to the absolute.

"We set science upon the throne of imagination, but we have crowned her with modesty, for she is at once the reality of human power and the personification of human fallibility."

We have great need in our agricultural investigation of a high realization of the method of research. This does not apply alone to the work carried on under the Adams fund, but should guide all the experimental activities of the stations, for it is that which distinguishes their work and deductions from those of everyday opinion. How essential, then, that the independent worker in every department of the subject should be thoroughly imbued with this method and all that it implies.

Although the research in agriculture is mainly in the field of applied science, we are realizing more fully every year that it must reach down to the fundamental and theoretical phases of the subject. We make sure progress only as this is done. The line between pure and applied science is largely an imaginary one, and research on a practical subject often leads over into the realm of pure science before it is realized. The main difference between these two kinds of science is the immediate purpose of the student and the limitation which he feels himself under. Pure science of to-day becomes highly practical and applied science to-morrow or next year, and the method and principles of both are the same. The process by which knowledge is acquired for a utilitarian end and the product itself are as pure as the most abstruse and theoretical studies.

87402°—No. 6—11——2

The term "pure science" has been a bugbear to many investigators in agriculture. Their fear of being accused of straying into that field has been due to the surveillance they were under. It has restricted their studies and their range of vision in a manner which has often been reflected in a lack of finality of their conclusions.

The fact that agricultural investigation is so young and has borrowed so largely from other sciences, and that the public demands and expectations are so insistent and often unreasonable, makes an unusual need of clearness and conviction on the part of its scientific workers and a moral support and defense of them in their effort. This sustaining power and protection must come first from the officials of the stations, those who are responsible for its policy and management and are from their position expected to exercise foresight and forebearance, based on an appreciation of the method and spirit of science; and through them it must reach out to a considerable body of the people through the agricultural press, associations, and various other agencies. Progress in this direction is happily one of the most encouraging signs of the day. The encouragement of thoroughgoing study finds at present increasing support and provision against interruption.

The public now realizes what science may do for the industry of agriculture; it must be taught to realize the limitations of a small group of men serving the people of a vast State, and the need of opportunity for them to work out this science step by step in their own way, without being pressed to make short cuts and reach immature conclusions.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

The constituents of asparagus and asparagus roots, J. L. WICHERS and B. TOLLENS (*Jour. Landw., 58 (1910), No. 2, pp. 101–112*).—This work was conducted for the purpose of determining certain physiological factors which have to do with the reserve substances in the asparagus plant.

The results showed that during the month of April more carbohydrates, easily hydrolyzable to glucose, were present in the main root and side roots than during the month of July. More nitrogen-free extractive substances, containing the easily hydrolyzable hemicellulose and sugars (E. S. R., 22, p. 111), were present in the side roots in April than in July, but in the main roots no difference could be determined in this respect for the different months. Crude fiber and pentosans were present in greater amount in the main roots, but in both kinds of roots the crude fiber and pentosan content was highest during July. On subtracting the easily hydrolyzable carbohydrates and pentosans the remaining nitrogen-free extractive substances contained in the main roots were found to be greater than those contained in the side roots.

The fat content of the asparagus root is small, and its amount has the same time relation as that of both crude fiber and pentosans. The largest amount of nitrogen was present in the side roots, where it was greatest in July. In the main roots the nitrogen content was about the same in April and July. The ash content was greatest in the main roots at all periods, and reached its maximum in April. The side roots contained less mineral matter in April than in July. The potassium in the main roots was found to be diminished in July, while that of the side roots was greatest at that time. Phosphoric acid was present to a greater extent in the side roots and the largest amount was found in July.

The carbohydrates of the asparagus plant, J. L. WICHERS and B. TOLLENS (*Jour. Landw., 58 (1910), No. 2, pp. 113–116*).—The results of an examination of the roots and buds showed that the roots probably contain glucose in the free state or as a part of another carbohydrate. Fructose was also present, but lactose could not be detected. The authors were in doubt in regard to saccharose. The juice from the buds was also found to contain glucoses but no polysaccharids. Mannit was probably present. See also the work of Tanret (E. S. R., 22, p. 112).

The soluble carbohydrates in asparagus roots, F. W. MORSE (*Jour. Amer. Chem. Soc., 33 (1911), No. 2, pp. 211–215*).—The material utilized for this work consisted of finely powdered samples of the individual root systems freed from dirt and dried at 50° C. They were secured during the month of November, the second year after setting, and when the translocation from the tops was believed to be complete. The average proximate composition of the dry substance in 16 roots was as follows: Protein 11.03, fat 1, fiber 15.39, nitrogen-free extract 66.34, and ash 6.24 per cent. These results show that the soluble nonnitrogenous matter included most of the reserve material of the roots, Twelve roots out of 25 showed a complete absence of reducing sugars, the remaining ones having only traces present. Total sugars were very abundant (from 26.4 to 50.8 per cent). The pentosan content for 16 samples ranged from 7.32 to 10.68 per cent of the dry substance. Galactans, which were determined in 4 individual samples and 1 composite sample, averaged 1.04 per cent. The diastatic method did not yield any reducing sugar, and only when the filtrates therefrom were treated with hydrochloric acid was there an average of 8.6 per cent of reducing sugar obtained, calculated as glucose. As the same 6 samples averaged 8.67 per cent of pentosans, calculated from furfuralphloroglucid, it is not probable that hydrolyzable carbohydrates are present which are accounted for by the analytical methods.

The analyses of the 16 roots in this connection showed a composition of sugars calculated as invert sugar of 41.43 per cent, pentosans 8.78 per cent, and galactans 1.04 per cent. The carbohydrates which formed over 40 per cent of the dry matter are probably fructose and glucose, the former being in great excess.

Enzymic condensation of sugars, E. PANTANELLI and G. FAURE (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 19 (1910), I, No. 7, pp. 389–394; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 572, I, pp. 450, 451*).—If *Aspergillus oryzæ* is grown on a liquid or solid medium containing starch, the amylolytic activity of the mold increases, even after the formation of spores. The maximum is reached after from 30 to 40 days at 25° C. An enzym is present which is capable of condensing dextrose or invert sugar, but which only appears after growing for from 35 to 40 days and where a decline of the starch digesting capacity begins to take place. The enzyms gradually increase to the eighth month, and then begin to disappear. Amylase, maltase, and invertase were sparingly present in cultures 1 year old. Maltose in neutral solutions is not condensed by the mycelium or by aqueous or glycerol extracts of *A. oryzæ*, but if a little alkali is present condensation occurs in a sirup which contains as little as from 8 to 10 per cent and as much as from 68 to 70 per cent of maltose.

In regard to the constitution of vicianose; diastatic hydrolysis, G. BERTRAND and G. WEISWEILLER (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 4, pp. 325–327*).—The authors show that the hydrolysis of vicianose proceeds according to the following equation: $C_{11}H_{20}O_{10}+H_2O=C_6H_{12}O_6+C_5H_{10}O_5$. According to this, vicianose must be composed of a hexose and a pentose and is therefore a disaccharid.

The filtration of rennet and pepsin, C. FUNK and A. NIEMANN (*Ztschr. Physiol. Chem., 68 (1910), No. 3–4, pp. 263–272*).—The tests show that a solution of rennet neutral to phenolphthalein can be filtered through a Chamberland filter without destroying its activity, while pepsin on the other hand and under the same conditions becomes inert. The authors point out that this difference is only apparent, since if the rennet solution were as acid as the pepsin solution the same amounts of alkali would have to be added to each, and this would then result in an inhibition of activity in the rennet.

Some further tests showed that the filtrate from pepsin which was treated with a 1 per cent solution of ammonium sulphate became inactive, while rennet did not. This was also shown to be only an apparent difference, due to the amount of ammonium sulphate added being always dependent upon the amount of ferment present.

The inactivation of rennet by shaking, SIGNE and SIGVAL SCHMIDT-NIELSEN (*Ztschr. Physiol. Chem., 68 (1910), No. 5–6, pp. 317–343*).—As a continuation of previous work (E. S. R., 22, p. 302), rennet extracts which were partly inactivated by forcible shaking were found to regain the greater part of their activity when allowed to stand in the same vessel for a short time. On the other hand, if the extract was at once transferred to another container no restoration took place. The authors explain this phenomena by stating that the shaking process brings about a concentration of the enzym on the foam formed by shaking and on the other surfaces. This was proved experimentally. They regard the nonreversible part of the inactivated enzym as adsorbed.

Contribution to our knowledge of amylase, A. Wohl and E. Glimm (*Biochem. Ztschr., 27 (1910), No. 5–6, pp. 349–375*).—This work deals with the causes of the incomplete hydrolysis of starch by amylase. The effect of different concentrations of maltose, saccharose, dextrose, levulose, galactose, mannose, dextrin, intermediary dextrins, and heat was studied. Dextrose was found to be the strongest inhibitor and mannose the weakest. Saccharose and levulose had no effect on the hydrolytic process.

The nuclease of the mammary gland, A. Borrino (*Arch. Fisiol., 8 (1909), No. 1, pp. 73–80; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 12–13, p. 603*).—Nuclease is only present in the mammary gland during lactation. Its presence indicates an active nuclein metabolism and is against Basch's theory [a] that casein is formed from nucleic acid and serum albumin. Possibly the phosphorus which is split off by nuclease plays a part in the formation of casein. See also a previous note (E. S. R., 22, p. 778).

Some further investigations in regard to the use of silk peptone for detecting peptolytic ferments, E. Abderhalden and E. Steinbeck (*Ztschr. Physiol. Chem., 68 (1910), No. 3–4, pp. 312–316*).—After describing the process for preparing silk peptone and the technique for detecting peptolytic ferments (E. S. R., 23, p. 708), the authors describe their results with pathological tissues and the stage at which peptolysis occurs during the development of the embryo.

Biochemical and toxicological studies upon a number of species of Penicillium, C. L. Alsberg and O. F. Black (*Abs. in Science, n. ser., 32 (1910), No. 823, pp. 478, 479*).—The results of this preliminary report show that there is much lack of uniformity in the toxic products produced by the mold of the genus Penicillium, and that only one of the specimens examined gave the characteristic ferric chlorid reaction for phenol.

Behavior of molds toward the stereoisomers of unsaturated dibasic acids, A. W. Dox (*Jour. Biol. Chem., 8 (1910), No. 3, pp. 265–267; abs. in Chem. Abs., 5 (1911), No. 1, pp. 100, 101*).—Five species of Penicillium and Aspergillus were studied in regard to the utilization of the carbon from fumaric, valeric, mesaconic, itaconic, and citraconic acids. Fumaric acid was used by all the species, valeric acid by a few, itaconic acid with a little more difficulty, and mesaconic and citraconic not at all.

Oxidation by mold fungi, A. Meier (*Über Oxydation durch Schimmelpilze. Diss., Tech. Hochschule Karlsruhe, 1909, pp. 94, fig. 1*).—This work, which was done chiefly with *Penicillium glaucum*, shows that the cleavage of racemates by mold fungi is also dependent upon oxidation.

On the oxidation of pyrogallol by hydrogen peroxid in the presence of plant extracts, H. H. Bunzel (*Abs. in Science, n. ser., 32 (1910), No. 823, p. 475*).—"Evidence is given that the oxidation of pyrogallol to purpurogallin by hydrogen peroxid in the presence of plant extracts takes place in two stages. The first is carried on by the hydrogen peroxid, the second by the oxidizing enzym in the plant extract."

---

[a] Jahrb. Kinderheilk., 47 (1898), p. 90.

Progress in systematic qualitative organic analysis, S. P. MULLIKEN (*Jour. Amer. Chem. Soc., 32 (1910), No. 9, pp. 1049–1057*).—A discussion as to the value of various methods of classifying organic substances for identification.

Researches in regard to the precipitins of honey, B. GALLI-VALERIO and M. BORNAND (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 7 (1910), No. 3, pp. 331–341*).—The results show that by injecting the protein of honey from various sources into rabbits a serum could be obtained which was specific for the honey from which the protein was derived. The method is of particular value for detecting adulteration with artificial honey.

Detection of invert sugar in commercial honey, H. QUANTIN (*Ann. Chim. Analyt., 15 (1910), No. 8, pp. 299–301*).—From this work the author concludes that the presence of the furfurol reaction in honey prepared by expression but without heat always indicates an adulteration. On the other hand, the presence of the furfurol reaction in honey extracted by heat does not indicate adulteration with certainty because the possibility exists of the production of furfurol during the heating process.

The use of the refractometer in the analysis of jams and jellies, marmalades and confections, W. CLACHER (*Internat. Sugar Jour., 12 (1910), No. 142, pp. 509–520*).—The method is as follows:

"Two gm. of the finely powdered sweet are weighed in a dry neckless stoppered weighing bottle 20 to 40 cc. capacity; 2 cc. of hot water are added and the sweet digested for a few minutes. Then the bottle with contents is cooled to 20° C., water added to make exactly 4 gm. of water and sweet, the emulsion shaken, and a portion transferred to another small dry stoppered weighing bottle for future reading with the refractometer; the bottle with the remanider of the emulsion is weighed, and to it added water at 20° to make the amount of water added to 1 gm. of sweetmeat of 5 gm. weight. The refractometric readings of these solutions are then read at 20° and from these the percentage sugars is calculated from the tables," which are given.

The estimation of small quantities of essential oil in spices, etc., J. A. BROWN (*Analyst, 35 (1910), No. 414, pp. 392–396, fig. 1*).—This method is based upon the same principle as the method for total volatile matter, previously described (E. S. R., 22, p. 513), with the exception that the gaseous products are conducted through an ordinary heated combustion tube containing copper oxid, and the carbon dioxid and water which are formed are collected and weighed. The volatile carbon was found to have a sufficiently close relation to the amount of volatile oil present.

A method for the determination of tin in canned foods, H. SCHREIBER and W. C. TABER (*U. S. Dept. Agr., Bur. Chem. Circ. 67, pp. 9*).—As the various methods, with the exception of Schryver's (E. S. R., 20, p. 1155), heretofore proposed for estimating the tin in canned foods yielded nonconcordant results, the authors elaborated an alkali fusion method for which the following advantages over the Schryver wet method are claimed: "(1) It decreases the errors of sampling; (2) it decreases the errors due to multiplication when calculating to milligrams per kilogram; (3) there need be no loss of samples if the material is properly ground and not heated too rapidly on the hot plate; (4) in the wet ashing methods it is necessary to neutralize a large amount of acid before precipitating with hydrogen sulphid."

The proposed method is conducted as follows: Weigh out 100 gm. of the sample with 10 gm. of magnesium oxid into an 8-oz. wrought-iron crucible, add 50 cc. of an alkaline solution containing 150 gm. of sodium hydrate and 100 gm. of sodium carbonate per liter, stir well, add 75 cc. of 95 per cent alcohol, and stir again. Then place on a steam bath, and apply a gentle gradual heat to evaporate off the alcohol. After the danger from frothing has ceased put on full heat until completion, and place on a hot plate covered with a sheet of asbestos (temperature from 130° to 160° C.), raise the temperature, and boil off the sulphuric acid. Then place in a cold muffle, heat gradually to expel volatile products, and finally burn the carbon away. After cooling, cover the residue with water and allow to stand for a few minutes. Then transfer the contents of the crucible by scraping with a spatula and washing, into a 600 cc. beaker, and add slowly 40 cc. of a 1:1 sulphuric acid. To the crucible add 10 cc. of dilute sulphuric acid, scrape, and wash the contents into the beaker. When the reaction is over, add to the solution 30 cc. of nitric acid (specific gravity 1.42) and 50 cc. of sulphuric acid (specific gravity 1.84), cover and boil briskly on a hot plate until fumes of sulphuric acid are given off, and allow to fume for 10 minutes. After this cool but do not allow to solidify, pass the stem of a funnel bent at an angle over the lip of the beaker, which is covered, and add successively small amounts of water from the wash bottle until violent action has ceased, then rapidly 150 to 200 cc. of water, and remove the funnel and watch glass cover. Wash the contents of the beaker into a 1-liter Erlenmeyer flask, cool, pass in hydrogen sulphid for a few seconds, and add ammonium hydroxid (28 per cent), rotating until the black color of the precipitate persists. Immediately make acid with 1:1 sulphuric acid, and add 10 cc. excess of dilute acid. Then dilute to 1 liter with boiling water and continue passing hydrogen sulphid rapidly for 25 minutes more, stopper, and allow to stand over night.

After this period heat on the steam bath for ½ hour, rotating 2 or 3 times during the interval, cool partly, filter on a 12.5 cm. filter, and wash 6 times, filling the filter each time with a solution consisting of 50 cc. of glacial acetic acid and 100 cc. of a saturated solution of ammonium acetate made up to 1 liter with water. Finally, return the precipitate and filter to the original Erlenmeyer flask, add 100 cc. of 20 per cent potassium hydroxid solution, boil over a free flame for a couple of minutes until the solution is clear and the paper disintegrated, decant into a 400 cc. beaker and through a double 12.5 cm. filter paper, and wash the flask and filter with hot water successively until the filtrate comes through colorless. After this add 20 cc. of concentrated hydrochloric acid, a few drops of phenolphthalein, then hydrochloric acid until the color of the solution disappears, and finally 1 cc. more of the acid. Test with litmus paper, place the solution on a steam bath for 20 minutes, and cover.

The next morning, if the solution is not acid make it so with hydrochloric acid, and then add 1 cc. in excess of this. If the supernatant fluid is acid and turbid then make it alkaline with potassium hydrate and bring it back to acidity with acid and add 1 cc. in excess. Heat on the steam bath for ½ hour, stirring 2 or 3 times during the interval, and then filter through a 12.5 cm. filter. The filtrate must be perfectly clear. Wash the precipitate alternately with distilled water and ammonium acetate solution until free from chlorids, then place it with the filter in a porcelain crucible, dry, char on asbestos gauze, burn, and weigh as stannic oxid.

The author points out that no necessity exists for weighing the tin in the metallic state. Comparative results obtained with this method and Schryver's with vegetables, fruit, and fish are given and show a satisfactory agreement.

Salicylic acid reactions, C. Reichard (*Pharm. Zentralhalle, 51 (1910), No. 33, pp. 743–749*).—A general discussion in regard to salicylic acid and its reactions.

The determination of lactose by the copper methods, L. Bourdet (*Bul. Sci. Pharmacol., 17 (1910), No. 1, pp. 16–19*).—A discussion of the value and application of the various methods for estimating lactose by Fehling's solution or modifications thereof.

The saccharimeter scale and the means of its verification, C. A. Browne (*Abs in Science, n. ser., 32 (1910), No. 823, p. 475*).—After discussing the various standards of saccharimeter scales, the methods for verifying the scale divisions of the saccharimeter by means of quartz plates, the control tube, and chemically pure sucrose are described. A recalculation of the sucrose value of the scale was made with Landolt's formula, the results of which show that the greatest error due to change of concentration is only 0.01° V., indicating that Schmitz' figure, 0.08, is wrong. The maximum error in graduation due to faulty quartz plates did not in any instance exceed 0.05° V.

"The relation between the French and German normal weights for sucrose according to measurements made upon a Laurent 'plaque type' was 26 gm. to 16.29 gm., which agrees with the weights officially prescribed in Germany and France."

Invert sugar and its significance for seed beet polarization, H. Plahn-Appiani (*Bl. Zuckerrübenbau, No. 17, pp. 277–282*).—The author states that the polarization must be taken as the index for beets in feed beet culture, and that the results of the determination of the dry substance should only be considered a secondary index in beet selection. The polarization and dry substance rarely run parallel, and the latter has a tendency to cover up the saccharose decomposition products instead of detecting them. Neither methods can be recommended for judging the beets in the fall.

The separation and estimation of aspartic and glutaminic acids, T. B. Osborne and L. M. Liddle (*Amer. Jour. Physiol., 26 (1910), No. 6, pp. 420–425*).—This is a study of methods, and has particular reference to the quantitative separation of glutaminic and aspartic acids from leucin. An improved method for this separation is given.

Note in regard to determining creatinin, P. Rona (*Biochem. Ztschr., 27 (1910), No. 4, p. 348*).—The author states that ferric hydroxid may be advantageously employed for removing the proteins in blood solutions in the determination of creatinin according to the Folin method (E. S. R., 17, p. 165). Work is also in progress to determine the fitness of this reagent for meat extracts.

Testing milk and its products, E. H. Farrington and F. W. Woll (*Madison, Wis., 1911, 20. ed., rev. and enl., pp. VI+297, pl. 1, figs. 61*).—This is the twentieth revised edition of this work (E. S. R., 9, p. 690).

Unification of methods for milk analysis, A. J. J. Vandevelde (*Rev. Gén. Lait, 8 (1910), No. 16, pp. 371–378*).—This consists of material presented before the section of bromatology of the International Congress of Applied Chemistry, London, 1909, and largely noted from another source (E. S. R., 23, p. 113).

About the estimation of lactose in milk, Bouin (*Rev. Gén. Lait, 8 (1910), Nos. 9, pp. 193–201; 10, pp. 230–236; abs. in Rev. Gén. Chim., 12 (1910), No. 18, Repert., p. 365*).—A formula is presented for the correction of the error which is introduced during the process of clarifying milk for sugar estimation, and due to the volume of the precipitate.

The detection of added water in milk, H. C. Lythgoe (*Mo. Bul. Bd. Health Mass., n. ser., 5 (1910), No. 10, pp. 419–426*).—The following conclusions are drawn from this work, which continues studies previously noted (E. S. R., 23, p. 12):

"The indirect calculation of milk sugar serves to indicate whether or not a sample of milk is pure, skimmed, or watered. If the proteins exceed the fat, the sample has been skimmed. If the copper serum has a refraction less than 36, a specific gravity less than 1.0245, or solids below 5.28 per cent, added water is indicated. If the refraction of the sour serum is less than 38.3, its specific gravity below 1.0229, or the ash less than 0.73 per cent, added water is indicated. Ten per cent of water may be detected if added to the average milk and 15 per cent can be detected if added to high-grade milk. The copper serum of cream and skimmed milk are about the same as that of the whole milk from which it had been separated."

Investigations in regard to the ash content of milk sera, R. SAAR (*Molk. Ztg. [Hildesheim], 24 (1910), No. 77, p. 1455*).—This work substantiates the work of other authors (E. S. R., 21, pp. 378, 413), and shows that the variations in the quantity of the ash of the serum may be employed as a criterion to detect added water to milk. A milk with a serum containing less than 0.7 per cent of ash is considered to be adulterated. Decomposition or souring of milk has no effect on the results.

Estimating the phosphatids in milk, V. NJEGOVAN (*Biochem. Ztschr., 29 (1910), No. 6, pp. 491–493*).—This is a preliminary announcement in regard to a method for estimating the phosphatids in milk, in which the milk is dried by Frankel and Elfer's method (page 585) with a definite amount of fused sodium sulphate. The dried milk is then extracted with alcohol at 40 to 50° C. in a Soxhlet extractor.

The reductase test compared with other milk hygienic methods of examination, C. BARTHEL (*Meddel. Centralanst. Försöksv. Jordbruksområdet (1910), No. 35, pp. 39, figs. 7*).—The author examined 137 samples of Stockholm market milk by the acidity, catalase test, alcohol, and reductase tests, and also made quantitative bacteriological tests of the samples. The relative value of these tests for milk inspection purposes is discussed. In making the reductase test he recommends observing the discoloration of the methylene blue solution after 3 hours. Good sanitary milk will not react with the test within this period.

The decomposition of milk and the simplest method for determining its nature and degree, W. MORRES (*Molk. Ztg. [Hildesheim], 24 (1910), No. 98, pp. 1838, 1839*).—After reviewing the existing tests proposed for this purpose, the author points out that the alizarin-alcohol test (E. S. R., 22, p. 515) is an ideal and simple method for detecting the nature and degree of decomposition of milks.

Some milk and butter tests, R. PAPE (*Transvaal Dept. Agr., Agr. Sci. Bul. 2, pp. 12, figs. 7*).—A short description of the lactodensimeter, Gerber's test for fat, acid test, alcohol test, alizarin test, curdling test, fermentation test, cheese fermentation test, dirt test, and moisture estimation in butter.

The examination of butter and margarin, L. GRÜNHUT (*Ztschr. Analyt. Chem., 49 (1910), Nos. 8, pp. 509–517, figs. 2; 9–10, p. 623–650*).—A review of the analytical methods and interpretation of the results for judging butter, oleomargarine, and allied fats.

A short method for detecting and estimating coconut oil in butter and margarin, H. S. SHREWSBURY and A. W. KNAPP (*Analyst, 35 (1910), No. 414, pp. 385–392*).—This method is based on the fact that a large percentage of the fatty acids of coconut oil, chiefly lauric and myristic, are soluble in a mixture of water and alcohol. Vandam [a] has also employed this principle, but the procedure is entirely different from this.

A study of cottonseed oil and cottonseed-oil cake, A. GUISELIN (*Matières Grasses, 3 (1910), No. 27, pp. 1861–1866*).—This is a study in regard to some points in the extraction, refining, and use of the oil for various purposes, and of the oil cake.

---

[a] Analyst, 26 (1901), p. 320.

Notes on the testing of coal-tar creosote, J. C. Mann (*Jour. Soc. Chem. Indus., 29 (1910), No. 12, pp. 732–734, figs. 2*).—A discussion and description of methods for examining coal-tar creosote for impregnating wood, etc.

Dressing and curing meat for farm use, W. H. Tomhave and D. A. Gaumnitz (*Univ. Minn., Dept. Agr., Ext. Bul. 11, 1910, pp. 20, figs. 13*).—This bulletin contains detailed information, with illustrations, in regard to the slaughtering and dressing of hogs, beeves, sheep, and veal on the farm. It also deals with the smoking and curing of meats, the preparation of lard and sausages, and the formation of beef clubs.

Influence of low temperatures on the ripening process of fruits and the fermentation of cider, H. C. Gore (*Abs. in Österr. Chem. Ztg., 13 (1910), No. 21, p. 261*).—The results of the work show that the chemical changes wrought by cold do not alter the character of the must but only diminish the intensity of the fermentation. The process goes on in a slower but normal manner. With fruits it was determined that a decided decrease in the carbon dioxid output takes place.

The manufacture of marmalades, E. Walter (*Pure Products, 7 (1911), No. 1, pp. 11–16, figs. 3*).—A general discussion of the subject, which considers the principles of manufacture, the yield, and the machinery employed.

The constituents of the wax of candelilla or Mexican wax plant, G. S. Fraps and J. B. Rather (*Abs. in Science, n. ser., 32 (1910), No. 823, p. 478*).—The authors isolated a hydrocarbon from this substance which had a melting point of 68° C. It was only partly soluble in cold ether or chloroform, but soluble in hot chloroform and difficultly soluble in cold or hot alcohol. The hydrocarbon is probably hentriocontane ($C_{31}H_{64}$), which has also been isolated from beeswax. Two other unidentified bodies were also found.

See also the work of Hare and Bjerregaard (E. S. R., 23, p. 615).

The trials of hop-drying plants, 1909, W. R. Elgar, J. Powell, and L. Briant (*Jour. Roy. Agr. Soc. England, 70 (1909), pp. 196–207, figs. 3*).—The results are given of a prize contest for the best hop-drying apparatus offered by the Royal Agricultural Society of England. Cuts illustrating the plan of various forms of apparatus entered are shown.

Mechanical sampler, C. Wolters (*Chem. Ztg., 34 (1910), No. 65, p. 579, fig. 1*).—A description and illustration of a mechanical sampler for obtaining average samples of salt, minerals, coal, etc.

Report of the activities of the agricultural-chemical control station at Halle for 1909, H. C. Müller (*Ber. Agr. Chem. Kontrollstat. Halle, 1909, pp. 58*).—The report contains the results of the chemical examination of soils, feeding stuffs, water, sewage, fertilizers, foods, dairy products, and miscellaneous substances, and of the microscopical examination of seeds, foods, feeding stuffs, water, and miscellaneous substances. A report on the activities of the cultural, the technical, and the various research divisions is also included.

Extracts from the proceedings of the Association of Official Agricultural Chemists, 1910 (*U. S. Dept. Agr., Bur. Chem. Circ. 66, pp. 27*).—This is a preliminary report of the proceedings, previously noted (E. S. R., 24, p. 196), of the Association of Official Agricultural Chemists for 1910, and contains the recommendations made by the referees and associate referees for nitrogen, potash, soils, inorganic plant constituents, insecticides, waters, foods and feeding stuffs, dairy products, tannin, medicinal plants and drugs, sugars, spices, separation of vegetable and meat proteids, fats and oils, organic and inorganic phosphorus, coffee, tea, cocoa and cocoa products, water determination in foods, baking powders, preservatives, reference tables, cereal products, flavoring extracts, detection of coloring matters, and standardization of alcohol tables, together with a report of the committee on by-laws and a list of the officers for the coming year.

Publications of the Bureau of Chemistry (*U. S. Dept. Agr., Div. Pubs. Circ. 7, pp. 5*).—This is a list of the publications of the Bureau of Chemistry of this Department available for distribution.

METEOROLOGY—WATER.

The meteorology of the future, C. Abbe (*Pop. Sci. Mo., 78 (1911), No. 1, pp. 21–35*).—This article reviews the history of the development of the science of meteorology, explains the forces which control weather phenomena, and discusses some of the problems affecting the future development of the science.

The author emphasizes the fact that weather conditions are as a rule controlled by great forces acting over immense areas and entirely beyond the control of man with the present knowledge available. He expresses the opinion "that we shall some day long years hence acquire some control of the atmosphere, but at the present time we are not ready for it, neither scientifically nor socially."

As regards periodic weather phenomena, the author is of the opinion that such periodicity is too feeble to be of importance or even to be clearly recognized. The climatic changes which seem to have taken place during geological history he thinks may be attributed to changes in orography of the continents and in the distribution of land and water. The use of explosives to produce rain is considered entirely futile.

International catalogue of scientific literature. F—Meteorology (*Internat. Cat. Sci. Lit., 8 (1910), pp. VIII+293*).—The literature indexed in this eighth annual issue of the international catalogue (E. S. R., 22, p. 417) "is mainly that of 1908, but includes those portions of the literature of 1901–1907 in regard to which the index slips were received by the central bureau too late for inclusion in the previous volumes. There are also entries dated 1909."

Meteorological summary for the year 1909, A. E. Bellis (*Wyoming Sta. Rpt. 1910, pp. 72–77*).—Tables are given which summarize observations during 19 years on temperature and precipitation and during 1909 on temperature, pressure, precipitation, humidity, sunshine and cloudiness, and solar radiation, at Laramie. The mean temperature at Laramie during 1909 was 38.7° F., the maximum, 90°, in July, and the minimum, −23°, in December. The total precipitation was 9.69 in. The average barometric pressure was 22.98 in. There were no frosts from May 25 to September 22, the period free from frosts being longer than usual. "The weather conditions for the year were generally normal or nearly so, there being no remarkable disturbances, storms, nor wind conditions."

[Meteorology and hydrography of the Canal Zone], C. M. Saville (*Ann. Rpt. Isthmian Canal Com., 1910, pp. 275–303*).—The organization and equipment of the meteorological and hydrographic service of the Canal Zone are briefly described and data are given for temperature, rainfall, evaporation, seismic disturbances, stream measurements, and the like, for the 18 months ended June 30, 1910.

Variations in rainfall and famine in German East Africa, E. Kremer (*Arch. Deut. Seewarte, 33 (1910), No. 1, pp. 64, figs. 19, charts 2*).—A critical examination of data bearing upon the relation of the Indian monsoon system to the rainfall of this region is reported, with a bibliography of the subject. No very reliable basis of predicting rainfall for the region is developed from the data.

[Temperature and rainfall of Cape of Good Hope] (*Statis. Reg. Cape Good Hope, 1909, pp. 47, 48*).—Tables are given which summarize the results of long period observations on temperature and precipitation at a number of places in this Province.

Composition of Barbados rainfall (*Rpt. Agr. Work Barbados, Imp. Dept. Agr. West Indies, 1907–1909, p. 3*).—A table is given which shows the amount, distribution, and composition of the rainfall at Dodds from December, 1907, to May, 1909. The total amount for the period was 55.67 in., supplying approximately 180.5 lbs. of chlorin and 6.88 lbs. of nitrogen per acre. By far the larger proportion of the nitrogen was in the form of nitrates.

Report on lightning strokes in Schleswig-Holstein, H. BRODERSEN (*Schr. Naturw. Ver. Schles. Holst., 14 (1909), No. 2, pp. 225–275, pl. 1*).—Detailed data on this subject dating back as far as 1874 are reported and discussed.

It is shown that 362 out of each million buildings in Schleswig-Holstein, which has an area of about 7,200 square miles, are annually struck by lightning. The number of buildings struck in the open country is nearly double that struck in the towns. The strokes were much more frequent and the damage was two and one-half times as great with buildings with thatched or wooden roofs as with slate or metal roofs. The greatest damage occurred on the average during the last third of July, the greatest number of electric storms occurring during that period. The greatest number of electric discharges was observed between 4 and 5 o'clock in the afternoon.

All kinds of trees were struck, but certain kinds more frequently than others, depending upon the character of the bark and wood, which in some cases furnish a poorer conductor and thus afford greater protection than others. Poplars were most frequently struck. Of 239 trees struck in 15 years, 109 were poplars, 26 oaks, 3 linden, 21 ash, 11 fruit, 10 willow, 10 pine, 6 alder, 3 elm, 1 birch, and 1 beech.

It was observed that strokes were two and one-half times more frequent in marshy than in dry sections, and that the frequency of strokes decreased with forest growth and increased with its removal. There was no evidence that chimneys attract lightning, but it seems quite clear that weather vanes do. Trees do not protect nearby buildings. Thirty persons and 393 animals were killed during the 15 years covered by these observations; 290 persons were struck (19 fatally) indoors and 22 (11 fatally) out-of-doors.

A study of hail protection appliances, J. VIOLLE (*Ann. Dir. Hydraul. et Amélior. Agr., Min. Agr. [France], 1907, No. 36, pp. 117–120*).—The experience in cannonading against hail is briefly reviewed. Among the conclusions drawn is that only systematic and vigorous cannonading can hope to produce any protective effect and it is doubtful whether this will have any deterrent effect upon sudden and violent storms.

Hydrological rôle of marshes, E. OPPOKOV (*Selsk. Khoz. i Liesov., 230 (1909), Sept., pp. 37–57; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 3, pp. 369–372*).—The author combats the opinion, dating from the time of Humboldt, that marshes absorb and store water in rainy seasons and give it up gradually to streams during dry periods. On the basis of observations on the basin of the Dnieper and on rivers of adjoining territory he shows that the intensified evaporation from marshes in periods of drought not infrequently results in the total drying up of the marshes. Such dry marshes develop a great capacity for water and readily absorb subsequent precipitations as well as the seepage waters from the higher ground, intercepting them on the way to the rivers and thus conducing to a decreased return of water to the rivers.

Water problems, W. M. Booth (*Jour. Indus. and Engin. Chem., 2 (1910), No. 12, pp. 503–510, figs. 9*).—Analyses of snow collected 2 miles from the center of Syracuse are reported and discussed with reference to natural contamination of rain and snow. The article is, however, devoted mainly to descriptions of methods and apparatus used in water purification for industrial purposes.

The practical sterilization of potable waters by means of the ultraviolet rays of light, J. C. Thresh and J. F. Beale (*Lancet [London], 1910, II, No. 26, pp. 1849–1851*).—Reviewing recent experiments with this method, the authors conclude that "there is little doubt that for small installations and for suitable waters, when electrical current is available, treatment with ultraviolet rays will be more economical than any other process yet devised, but it remains to be seen whether, under such circumstances, it will be able to compete with the chlorin process as now simplified and improved."

The sterilizing ultraviolet ray (*Sci. Amer. Sup., 70 (1910), No. 1825, p. 404, figs. 2*).—The Nogier process is briefly described.

The purification of dairy wash water by means of irrigation (*Molk. Ztg. [Hildesheim], 24 (1910), Nos. 7, p. 115; 9, pp. 148–150; 11, p. 185; abs. in Wasser u. Abwasser, 3 (1910), No. 9, p. 362*).—This method of disposal proved successful on light sandy soils when care was taken not to use excessive amounts of the wash water and to keep the land in good physical condition. Grass, clover, and trees grow vigorously on the irrigated land. It is not advisable to pasture animals on the land.

Ways and means of having healthy homes and summer resorts, R. Fletcher (*N. H. Sanit. Bul., 3 (1911), No. 12, pp. 205–238, figs. 18*).—This bulletin deals in a plain, practical way with the disposal of household refuse and water-borne sewage; the modified cesspool or sewage tank with subsurface disposal; a controlled cesspool; dry disposal; disposal of slops, waste, and garbage; ways of contamination and protection of drinking water; and construction of wells. Data are also given regarding the cost and size of sewer pipes and their protection from freezing, bills of materials for sewerage systems, protection of garbage from flies, and legal and personal aspects of the sanitation problem. A list of the leading authorities on the subject is added.

Clarification of sewage, R. Schmeitzner, trans. by A. E. Kimberly (*New York and London, 1910, pp. XV+114, pls. 2, figs. 37*).—This is an English translation of a German book which gives a detailed account of a trip of inspection to a number of the larger German clarification plants. It deals almost exclusively with the engineering features of the construction and operation of these plants.

The interest in this book from an agricultural standpoint centers mainly in the chapter on sludge removal and treatment for the recovery of by-products, which contains a section on the treatment of sludge for the preparation of fertilizer base. The author takes the position that sludge should be used for agricultural purposes wherever it is possible to do so, and he calls attention to a process by which sufficient fat and fertilizer may be obtained from sewage containing considerable amounts of fat to pay the cost of the operation.

Sewage sludge disposal, W. B. Ruggles (*Engin. Rec., 63 (1911), No. 3, pp. 79, 80*).—Various methods of sludge disposal as well as the Berlin and Paris methods of sewage irrigation are referred to and the method employed at Bradford, England, for the preparation of sludge fertilizer is described in some detail.

In the process used at this place the sludge as it comes from the filter presses, containing about 33 per cent of water, is run into rotary driers, where the moisture content is reduced to about 10 per cent. The material comes from the driers in the form of dry, round pellets of about the size of peas. In this condition it is inoffensive and can be readily shipped in bags or ground to a powder. Two analyses of the dried sludge which are reported show nitrogen 2.15 and 2.61 per cent, respectively, phosphoric acid 0.31 and 0.11 per cent, and potash 0.24 and 0.31 per cent, with an estimated fertilizer valuation of $6.76 and $10.79 per ton, respectively. The material sells at the works for $2.17 per ton.

The author is of the opinion that the dried sludge is an ideal fertilizer filler, and estimates that the cost of preparing the material commercially would amount to about $1.66 per ton.

SOILS—FERTILIZERS.

The soil, J. DUMONT (*La Terre Arable. Paris, 1910, 2. ed., pp. XVI+323, figs. 20; rev. in Rev. Sci. [Paris], 48 (1910), II, No. 24, p. 766*).—This is a second revised edition of this treatise (E. S. R., 19, p. 619), rendered necessary by the rapid development of science as applied to soils.

A soil survey of Randolph, Wayne, Henry, Rush, Fayette, Union, and Franklin counties, Indiana, A. E. TAYLOR (*Ind. Dept. Geol. and Nat. Resources Ann. Rpt., 34 (1909), pp. 15–127, pls. 2, maps 7*).—A soil survey of these counties is reported, in which the following soil types were mapped: Miami clay loam, Miami black clay loam, Huntington loam, Wabash loam, Wabash silt loam, muck, Miami loam, Miami silt loam, oak forest silt loam, limestone slope clay loam, and Hamburg loam. The soils all belong to either the Later Wisconsin or the Illinoisan Drift formation.

A soil survey of Vanderburgh, Gibson, and Pike, and parts of Warrick and Spencer counties, Indiana, C. W. SHANNON (*Ind. Dept. Geol. and Nat. Resources Ann. Rpt., 34 (1909), pp. 129–261, pls. 11, maps 5*).—From the results of a soil survey of these counties the following soil types were established: Miami silt loam (loess), lake plain soil, alluvial soils, Miami sand, swamp deposits, till and terrace, sand dunes, residual, Waverly clay loam, Waverly silt loam, Waverly clay, Miami fine sandy loam, and Waverly fine sandy loam.

The soils of the Upper Burnett, J. C. BRÜNNICH (*Queensland Agr. Jour., 25 (1910), No. 5, p. 248, table 1, map 1*).—A geological sketch map is given and data on chemical analyses of soils from various parts of the district are reported. It is stated that the soils are of mixed origin and as a rule very fertile, containing unusually high amounts of lime in a very available form.

The chemical and mineralogical examination of some Chinese tea soils, W. O. ROBINSON and W. J. MCCAUGHEY (*Jour. Indus. and Engin. Chem., 2 (1910), No. 11, pp. 462, 463*).—The results of chemical, mechanical, and mineralogical examinations of 3 samples of Chinese tea soils from the northern central part of the Province of Fukien are reported. The chemical composition was found to be much the same as that of fertile American soils, but in general type characteristics the soils do not correspond to any yet described in the United States.

The salt lands of the Nira Valley, H. H. MANN and V. A. TAMHANE (*Dept. Agr. Bombay Bul. 39, pp. 35, fig. 1*).—It is stated that the development of salt lands in the Nira Canal area is due to seepage from a canal and the consequent raising of the water level of the soil. The salts come from the subsoil water and are composed principally of sodium sulphate and sodium chlorid mixed with varying quantities of magnesium salts. There is very little sodium carbonate. A system of reclamation by means of resistant crops, frequent irrigation, and a series of drains running across the line of natural drainage at short intervals at a depth of 2½ ft. has been found very efficient.

Importance and action of soil colloids in the determination of soil surfaces by the Rodewald-Mitscherlich method, P. EHRENBERG (*Ztschr. Angew. Chem., 23 (1910), No. 39, p. 1841; Chem. Ztg., 34 (1910), No. 113, p. 1006; abs. in Jour. Soc. Chem. Indus., 29 (1910), No 20, p. 1217*).—It is pointed out that air drying of a soil, as is done in the Rodewald-Mitscherlich method (E. S. R., 15, p. 847), appreciably reduces the soil surface, especially when the percentage of humus is high, and consequently lowers the hygroscopicity. The author therefore proposes to determine the vapor tension over 10 per cent sulphuric acid on the undried soil. Many other agencies besides drying affect the surface area, and soils of almost the same surface area have very different physical properties.

Contributions to physical soil investigation, P. EHRENBERG and H. PICK (*Ztschr. Forst u. Jagdw., 43 (1911), No. 1, pp. 35–47*).—This article is based upon the investigations noted above.

Significance of the osmotic pressure and electrolytic conductivity for the study of the soil, J. KÖNIG, J. HASENBÄUMER, and H. MEYERING (*Landw. Vers. Stat., 74 (1910), No. 1–2, pp. 1–56, pl. 1, figs. 5; abs. in Jour. Chem. Soc. [London], 98, 1910, No. 578, II, p. 1104; Zentbl. Agr. Chem., 40 (1911), No. 2, pp. 73–75*).—Investigations on osmotic pressure and electrolytic conductivity in their relation to vegetation are reported. The apparatus used in determining the osmotic pressure consisted of filter candles, a glass cylinder, and a thermoregulator. The observations on the electrolytic conductivity were made by the Kohlrausch method, using a Wheatstone-Kirchhoff bridge, rheostat, and thermoregulator. The results were studied in their relation to the kind of soil and its absorptive capacity, the action of different fertilizers, and the effects of different crops.

The determination of the osmotic power of the plant to take up water gives good results when the temperature is kept constant. The variations by this method are much less than in earlier investigations, a much more gradual and regular rise and fall in the water-absorptive power being observed. A temperature of from 18 to 20° C. is best, 18° being taken in this case to correspond to that of the electrolytic conductivity. The temperature of 25° formerly used is not recommended because at this temperature a strong diosmose of the salts takes place and considerable quantities of gum are dissolved from cells of the apparatus. The degree of diosmose of salts in the study of the osmotic power of the plant depends upon the nature of the salt and probably upon the character, i. e., the uniformity of the semipermeable membrane. For substances that are not, or are only slightly, diosmotic this method may be used advantageously in determining the molecular weight. With strongly diosmotic materials the determination of the isotonic pressure by a solution of no, or one of slight, diosmotic power may be used for that purpose.

The determination of the electrolytic conductivity of the soil, in general, gives results that stand in close relationship to the osmotic power. An absolute agreement, however, is not to be expected, since the soils vary in their physical and chemical relations. Ordinary fertilizing increases the osmotic properties as well as the electrolytic conductivity of all soils, whereas the growth of vegetation decreased both of them. The osmotic property, therefore, as well as the electrolytic conductivity is an expression of the degree of solubility of the plant food of the soil, the method of determining the electrolytic conductivity being the simpler and more rapid, whereas that of determining the osmotic property seems to be the most certain and accurate when good osmometers are used. The electrolytic conductivity increased with the decrease in size of the soil particles.

The potassium and phosphoric acid of the dipotassium phosphate, given in quantities below the maximum absorptive capacity, were absorbed completely, while the sulphuric acid of the sulphates was absorbed only partly, and the chlorin of the chlorids and nitric acid of the nitrates remained unabsorbed. The absorbed nutrients did not again go into solution upon treatment of the soil with water. The soil treated with potassium phosphate showed no increase in electrolytic conductivity; on the other hand, those treated with chlorids, nitrates, and sulphates did show an increase, a fact indicating that both the potassium and phosphoric acid of the potassium phosphate are absorbed.

Soils treated with hydrogen peroxid showed an increase in yield of vegetation provided the soils were supplied with a complex humus acid salt or humus colloids. A definite action similar to that of the hydrogen peroxid was not obtained with calcium peroxid. Plants grown on a soil poor in potassium and rich in lime assimilated a small amount of the former and a correspondingly larger amount of the latter and vice versa. It appears that these two bases have the property of replacing each other in the soil to a certain extent. The growth of red clover increased the soluble nutrients of the soil as was shown by the increased yield of rye, the increased amount of material rendered soluble by steaming, and the improved osmotic properties of the soil following the growth of clover.

The determination of the electrolytic conductivity of soils, J. König, J. Hasenbäumer, and H. Meyering (*Ztschr. Angew. Chem., 24 (1911), No. 3, pp. 103–106, figs. 3*).—This is a brief account of investigations reported in full in the article noted above.

The amount of water in certain soils at the end of the winter of 1909–10, A. Demolon and G. Brouet (*Jour. Agr. Prat., n. ser., 19 (1910), No. 17, pp. 535, 536*).—With a view to determining the variation in degree of saturation of different kinds of soils, determinations were made of the moisture in sandy, clay, and humus soils after a prolonged wet period. It was found that the humus and clay soils were nearly saturated while the sandy soil contained only half as much moisture.

Relations between physical constitution of soils and the distribution of irrigation waters, A. Müntz, L. Faure, and E. Lainé (*Ann. Dir. Hydraul. et Amélior. Agr., Min. Agr. [France], 1907, No. 36, pp. 121–223, pls. 6, figs. 12*).—In continuation of previous studies on the relation of permeability of the soil to irrigation (E. S. R., 18, p. 288)[a], the authors extended their investigations to include the relation of other physical properties, including mechanical composition, absorptive power, density, porosity, capacity for water and air, and capillarity, in addition to permeability. Special forms of apparatus for studying the physical properties of the soil in place and in the laboratory are described, and the investigations were made upon a large number of different kinds of soil.

The results confirm those of previous investigations in showing that permeability is the controlling factor in relation to the water requirements of soils, and that by careful determinations of this property it is possible to estimate with a high degree of accuracy the method and rate of irrigation which will give the best results on any given soil.

A simple form of apparatus for determining permeability of soils in place is shown in figure 1. It consists essentially of a steel cylinder C 25 cm. long and 112 mm. interior diameter, which is carefully forced into the soil to the

[a] See also Ann. Dir. Hydraul. et Amélior. Agr., Min. Agr. [France], 1905, No. 33, pp. 45–96, figs. 3.

desired depth (6 cm.). A graduated (5 to 10 l.) flask *F*, with rubber stopper and glass tube *T* 1 cm. in diameter is inverted with its neck in the steel tube, as shown in the figure, and maintains a constant level of water 3 cm. above the surface of the soil. The rate of percolation of water through the soil is shown on the graduated scale of the flask.

Investigations with humus, J. Hudig (*Cultura, 22 (1910), No. 267, pp. 530–548*).—This article reviews previous investigations on the character of the humus substances of the soil, and reports pot experiments with oats on sand to which had been added varying amounts of humus (sodium hydroxid) extracts, organic matter, artificial humus prepared by boiling sugar with hydrochloric acid, and pyrogallol, with a basal fertilizer furnishing sufficient amounts of phosphoric acid, potash, and nitrogen, and ground limestone or sodium carbonate to correct acidity.

Humus extract and organic matter combined produced sickness in the oat plant. Increased amounts of sugar humus reduced the sickness of plants. Pyrogallol soils showed no plant sickness during the first three seasons, but during the fourth season those soils which had received calcium carbonate or sodium carbonate were affected. The author concludes that pyrogallol leaves an insoluble substance in the soil which is changed by culture and fertilizing and thus causes the plants to become sick.

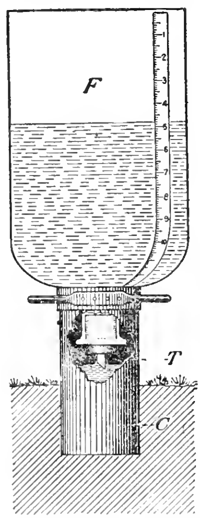


Fig. 1.—Apparatus for determining permeability of soils in place.

On the influence of humus substances on the decomposition of urea into ammonia, H. R. Christensen (*Tidsskr. Landbr. Planteavl, 17 (1910), No. 1, pp. 79–109, pl. 1*).—In a study of the conditions of the decomposition of urea in the presence of humus substance a small rod bacterium (*Urobacillus beijerinckii* n. sp.) was isolated which can decompose urea into ammonium carbonate even in the absence of other organic substances. This result is of interest biologically because the bacillus is the only organism now known which can utilize urea as a carbon nutrient. A description of the characteristics of the bacillus is given, with reproductions of photographs of agar and bouillon plate cultures.

Pentosans in soils, E. C. Shorey and E. C. Lathrop (*Jour. Amer. Chem. Soc., 32 (1910), No. 12, pp. 1680–1683*).—The official method of determining pentosans, based upon the amounts of furfural obtained on boiling with hydrochloric acid, was applied to 10 soils, 10 gm. of soil being boiled with 12 per cent hydrochloric acid until there was no further evolution of furfural. The pentosan carbon in the soil as determined by this method varied from 1.3 to 28.53 per cent. The third lowest result, 1.83 per cent, was obtained from a soil containing the largest quantity of organic matter.

A further study of a soil type containing 2.75 per cent of pentosan indicated that while a crude pentosan was probably present in this soil as a plant residue, it can not be assumed that the formation of a pentose sugar, and from it furfural, necessarily indicates the presence of a pentosan as such, since pentose sugars are a part of the complex molecule of nucleoproteins and phosphatids and are split off from these on heating with acids.

Some acid constituents of soil humus, O. Schreiner and E. C. Shorey (*Jour. Amer. Chem. Soc., 32 (1910), No. 12, pp. 1674–1680*).—This article describes the properties and methods of isolation from soil humus of α-monohydroxystearic acid ($C_{18}H_{36}O_3$), paraffinic acid ($C_{24}H_{48}O_2$), and lignoceric acid ($C_{24}H_{48}O_2$). The soil from which the monohydroxystearic and paraffinic acids were isolated was an Elkton silt loam almost white in color, high in clay and silt, and containing 0.53 per cent of organic carbon and 0.066 per cent of nitrogen. The lignoceric acid was isolated from a peat soil containing 27 per cent of organic matter.

The presence of arginin and histidin in soils, O. Schreiner and E. C. Shorey (*Jour. Biol. Chem., 8 (1910), No. 5, pp. 381–384, pl. 1*).—This article reports the isolation from a clay soil of histidin and arginin, products of the decomposition of organic nitrogenous matter in the soil. These compounds were usually found together but in varying proportions depending upon the protein compounds from which they were derived. A modification of the Kossel and Kutscher method of precipitation with silver sulphate was used in the isolation of the compounds.

Pyrimidin derivatives and purin bases in soils, O. Schreiner and E. C. Shorey (*Jour. Biol. Chem., 8 (1910), No. 5, pp. 385–393, pl. 1*).—This paper reports the isolation from a loam soil of cytosin, xanthin, and hypoxanthin, products resulting from the decomposition of nucleoproteids present in the plant and animal remains that find their way into the soil. Since the purin bases were found in the majority of the soils examined and are easily changed from one form to another through the activity of enzyms or micro-organisms, the authors suggest that further investigation may establish some relation between the presence of some one of these bases and the presence of some particular micro-organism or combination of biological factors.

Methoxyl in soil organic matter, E. C. Shorey and E. C. Lathrop (*Jour. Amer. Chem. Soc., 33 (1911), No. 1, pp. 75–78*).—Methoxyl was found (by the Zeisel method) in small amounts in all but 2 of 10 soils widely varying in type and character of organic matter. The quantity of methoxyl bore no constant relation to, and is perhaps an unimportant part of the total organic matter of, the soil. It is probably derived from the decay of vegetable matter in the soil, and its variation in soils of the same type indicates "some fundamental difference in the chemical, physical, or biological factors that decide in what way a complex organic compound shall break down or decay when added to a soil."

Glycerids of fatty acid in soils, O. Schreiner and E. C. Shorey (*Jour. Amer. Chem. Soc., 33 (1911), No. 1, pp. 78–80*).—Glycerids were obtained from the Elkton silt loam as the final step in the treatment which resulted in the isolation of α-hydroxystearic acid and paraffinic acid. The alcoholic filtrate from the lead precipitate of paraffinic acid was freed from lead by hydrogen sulphid and the alcohol evaporated, which left an orange-colored oil that proved to be a mixture of glycerids of fatty acids. It is believed that the presence of glycerids in the soil can perhaps best be explained on the ground that they are unchanged plant residues that have resisted decomposition.

Paraffin hydrocarbons in soils, O. Schreiner and E. C. Shorey (*Jour. Amer. Chem. Soc., 33 (1911), No. 1, pp. 81–83*).—The hydrocarbon, hentriacontane ($C_{31}H_{64}$), was isolated from a peaty soil from North Carolina containing 27 per cent of organic carbon. There was nothing to indicate that it may not be an unchanged plant residue.

Toxic substances excreted by plant roots in the soil, K. Rördam (*Haven, 10 (1910), Nos. 22, pp. 275–282; 23, pp. 287–290; 24, pp. 297–301*).—This is a historical sketch with a brief review of recent studies relating to the subject of soil fertility.

Proportions of lime to magnesia in soil, R. R. SNOWDEN (*Rural Californian, 34 (1910), No. 12, pp. 358–360*).—Investigations are briefly reported in this article which led the author to believe that many cases of malnutrition, particularly incipient chlorosis or mottled leaf in orange and lemon trees, can be traced to an excessive proportion of magnesia to lime in the soil.

Analyses of sick and healthy leaves showed that the potash had increased in the sick leaves to more than two and one-half times that in the healthy leaves and the phosphoric acid to more than eleven and one-half times as much, while there had been a marked decline in the percentage of lime.

Examinations of a number of soils on which sick and healthy trees were growing showed that when the percentage of lime in the soil was less than twice that of the magnesia there was derangement of nutrition in orange trees. Lemon trees, however, appeared to be more tolerant of this condition, and it is thought that this explains why mottled leaf is far more prevalent with oranges than with lemons. With lemons the limit of safety appears to lie somewhere between 0.67 and 0.84 part of lime to one of magnesia.

Examinations of soils from a large number of citrus-growing districts showed that unfavorable proportions of lime to magnesia widely prevailed. Of 32 samples of soil examined only 13 contained the required proportion of lime from the standpoint of orange growing.

Attention is called to the fact that lime is more rapidly depleted than magnesia by the processes of nutrition, and methods of overcoming the unfavorable conditions thus brought about are suggested.

Laboratory studies of the influence of magnesia on the solubility of lime salts were made in which mixtures of equal amounts of magnesium and calcium carbonates and of magnesium and calcium sulphates, and a soil containing twice as much magnesia as lime, were used. It was found that in the case of the carbonates 23 per cent of the magnesia and a mere trace of the lime were dissolved; in the case of the sulphates 18 per cent of the magnesia and 7 per cent of the lime were dissolved; and in the case of the soil the water extract contained 19 times as much magnesia as lime. "The trees growing in this soil, unable to assimilate sufficient lime to supply their needs, absorbed the larger amount of potash noted in the yellow leaves to supply the deficiency of bases, the salts of potash being independent of a condition of acidity for their solution."

Improving alkaline lands, T. B. ROBERTSON (*Jour. Dept. Agr. So. Aust., 13 (1910), No. 12, pp. 1046–1050*).—The author briefly reviews work by Osterhout on the antagonistic action of different salts in nutrient solutions (E. S. R., 19, p. 1129), and suggests that the results of these investigations may find a rational application in methods of correcting the alkalinity of soils, that unproductive soils containing an excess of magnesia may be improved, and that a variety of soils of low fertility may be made productive by a study of the nature and amounts of mineral salts in the soil water and by a judicious addition of other salts.

A short bibliography of the subject is given.

On the agricultural value and the fertilizer requirements of the Norrbotten marsh soils, P. HELLSTRÖM (*K. Landtbr. Akad. Handl. och Tidskr., 49 (1910), No. 5, pp. 372–407, pls. 16*).—This article gives a condensed report of investigations and trials relative to the agricultural value of the Norrbotten marsh lands that have been conducted during late years at the chemical plant biological station at Lulea.

The results obtained show that the marshes can by proper treatment be brought up to as high a productive capacity as mineral soils for growing both green oats and hay crops. In order to give similar yields they require larger amounts of plant food than the latter, this being preferably given in the form of artificial fertilizers. Newly broken marsh land calls for applications of soluble nitrogen similar to mineral soils and larger applications of potash and especially phosphate; in addition, lime must be supplied in similar amounts.

The action of mineral fertilizers on the permeability of soils, P. LARUE (*Rev. Sci. [Paris], 48 (1910), II, No. 27, pp. 842, 843*).—Results obtained in investigations by Garola, Pearson, Kravkov, and Blanck (E. S. R., 23, p. 121) are briefly discussed, and it is shown that Blanck's results confirm those of Garola as regards the retarding effect of nitrate of soda on permeability. The results of the two investigators also agree in showing that both lime and potash increase the permeability.

On the other hand, Pearson and Kravkov concluded from their investigations that potash salts, as well as nitrate of soda, decreased percolation.

Results of field experiments to determine the fertilizer needs of soils (*Bul. Admin. Agr. [Brussels], 3 (1910), No. 10, pp. 373–403*).—This is an account of field experiments made during 1906 to 1909 on typical soil areas in Belgium, from which conclusions are drawn as to the fertilizer needs of the particular soils experimented with and also as to the unavoidable error in such experiments. It was found in 58 experiments that the average variation between the results on three plats fertilized and treated in exactly the same way was 8.25 per cent, and was in some cases as high as from 10 to 12 per cent.

Report of field and fertilizer trials conducted by the Swedish Moor Culture Association, 1909, H. VON FEILITZEN (*Svenska Mosskulturför. Tidskr., 24 (1910), Nos. 4–5, pp. 382–434, figs. 8; 6, pp. 471–507*).—The report describes trials conducted during the year at Jönköping, Flahult, and Torestorp stations. Full meteorological data for the three stations, soil temperatures, and readings of the depth of the water table on the different experimental fields and plats are also given.

Fertilizer trials and variety tests conducted by county agricultural societies in Sweden, 1909, P. BOLIN (*K. Landtbr. Akad. Handl. och Tidskr., 49 (1910), No. 6, pp. 449–489, dgms. 2*).—The main results of 594 separate trials conducted in 17 different counties are given and discussed. The trials included fertilizer experiments and variety tests with the small grains, root crops, meadows, alfalfa, and lupines.

Storage experiments with farm manure, F. HANSEN and R. K. KRISTENSEN (*Tidsskr. Landbr. Planteavl, 17 (1910), No. 1, pp. 1–78, figs. 13*).—The experiments here described were of a preliminary nature and were made with a view to insuring correct methods of sampling and analysis of farm manure in the extensive manure storage experiments that are to be conducted at the experiment stations at Aarslev and Studsgaard. The results obtained showed that farm manure under favorable conditions of storage can be kept for 9 months without losing more than from 6 to 7 per cent of its nitrogen. The main part of the report is taken up with discussions of the methods of sampling and analysis of farm manure.

Fertilizer experiments, L. B. MCWETHY and J. D. TOWAR (*Wyoming Sta. Rpt. 1910, pp. 53, 54*).—Tests are reported which show that nitrate of soda was very beneficial to oats and barley.

The nitrate industry, B. D. OSSA (*Bol. Soc. Fomento Fabril [Chile], 27 (1910), No. 11, pp. 741–748, dgms. 4*).—The present status of this industry is described, statistics of production, exportation, consumption, and prices from 1880 to 1910 are given, and the various uses made of nitrate are discussed and graphically illustrated.

Norwegian nitrate, lime nitrogen, and nitrogen lime, J. König (*Ztschr. Landw. Kammer Braunschweig, 79 (1910), Nos. 33, pp. 405–407; 34, pp. 416–418; Landw. Wchnbl. Schles. Holst., 60 (1910), No. 22, pp. 385–391*).—This article describes processes of manufacture, and reviews investigations on changes which cyanamid undergoes and on its value as a fertilizer.

The manufacture of air nitrate, O. Schönherr (*Chem. Engin., 11 (1910), No. 5, pp. 129–140, figs. 7*).—This is an English translation of a German article which has already been noted (E. S. R., 22, p. 127).

The use of potassic fertilizers on primitive soils, H. Guépin (*Jour. Agr. Prat., n. ser., 20 (1910), No. 30, pp. 111, 112*).—Experiments showing the beneficial effect of potash fertilizers on Brittany soils derived from primitive granitic rocks are briefly noted.

Potash deposits in the Netherlands, D. J. Hissink (*Cultura, 22 (1910), No. 268, pp. 612–617*).—This is a report on the potash deposits which were recently discovered in the Netherlands. These deposits seem to be of the same formation as those of Germany. Analyses of samples gave a potash content of from 3 to 14.6 per cent. The extent of the deposits has not yet been determined.

Tests of Palmaer phosphate, L. Grandeau (*Jour. Agr. Prat., n. ser., 20 (1910), Nos. 27, pp. 11, 12; 28, pp. 47–49*).—Comparative tests of this phosphate (dicalcium phosphate) and of superphosphate and Thomas slag with a variety of crops during 1908 and 1909 at the Flahult Moor Culture Station are reported. The results obtained with the new phosphate on the moor soil compared favorably with those obtained with the superphosphate and Thomas slag.

Floats, E. W. Gaither (*Ohio Sta. Circ. 105, pp. 3*).—It is stated that the use of floats in connection with farm manures and green manures is becoming quite extensive in Ohio, and this circular was prepared to furnish information on the subject.

Solubility of calcium phosphate in saturated solutions of carbon dioxid containing ammonia, B. Foster and H. A. D. Neville (*Abs. in Proc. Chem. Soc. London, 26 (1910), No. 375, p. 236; Jour. Soc. Chem. Indus., 29 (1910), No. 22, p. 1323*).—"The solubility of calcium phosphate and of the phosphates in commercial phosphatic manures was determined in saturated solutions of carbon dioxid containing ammonia. With increasing quantities of ammonia the quantity of phosphate passing into solution increases at first rapidly, and then more slowly, the solubility of phosphate then being almost directly proportional to the amount of ammonia present."

Investigations on the lime requirements of soils, H. R. Christensen and O. H. Larsen (*Tidsskr. Landw. Planteavl, 17 (1910), No. 3, pp. 407–509, figs. 4*).—Extensive experiments were conducted by the authors during 1907 to 1909 for the study of laboratory methods for determining the need of lime fertilization on Danish soils. Plat experiments with calcium carbonate were conducted on a large number of farms in different parts of the country and 129 soil samples from these plats were secured and analyzed according to the following methods: Qualitative and gravimetric determinations of carbonate, the former by effervescence with dilute hydrochloric acid; determinations of ammonium chlorid soluble lime (Meyer's method); reaction of the soil; and the biological lime test (behavior toward Azotobacter).

From the results obtained the authors conclude that none of the laboratory methods renders direct liming experiments superfluous and such are advocated where it is practicable to conduct them. Farmers so situated that they can not conduct field experiments are, however, urged to have their soils examined before they apply large quantities of lime or marl. The laboratory examinations may properly commence with the acid test, and soil samples that effervesce strongly need not be further examined. Those that do not, or only faintly, effervesce are examined by the litmus and Azotobacter tests, which should always be made concurrently as they mutually supplement and control each other. In the relatively few cases where these tests do not give a decisive answer, as with neutral or faintly alkaline soils and with weak Azotobacter growth, a determination of the lime soluble in ammonium chlorid solution is also recommended.

Carbonate of lime (*New England Farmer, 89 (1910), Nos. 38, p. 7, fig. 1; 39, p. 7, fig. 1; 40, p. 7, fig. 1; 41, p. 7, fig. 1; 42, pp. 7, 14; 43, p. 7; 44, p. 7, figs. 2; 45, p. 7; 46, p. 7; 47, p. 7, figs. 2; 48, p. 7, figs. 2; 49, p. 7, figs. 3; 50, p. 7, figs. 3*).—This is a compilation of general information, results of experiments, and expert opinions on carbonate of lime as a soil improver, especially on New England soils.

Utilization of distillery vinasse, CALMETTE (*Ann. Dir. Hydraul. et Amélior. Agr., Min. Agr.* [*France*], *1907, No. 36, pp. 99–104*).—This article gives in brief the results of investigations by a committee appointed to inquire into the question of practical methods of purification of distillery vinasse provided it can not be used in agriculture.

An analysis is reported of a sample of vinasse which contained about 0.07 per cent of nitrogen, 0.18 per cent of potash, and 0.06 per cent of phosphoric acid, showing that the material possesses considerable fertilizing value. It was found, however, that it could not be applied to the soil in crude condition in sufficient quantity for fertilizing purposes without danger of modifying the chemical and cultural properties of the soil. Previous biological purification is recommended.

Composition and use of Henequin (sisal) pulp, A. HEBERT and F. HEIM (*Compt. Rend. Acad. Sci.* [*Paris*], *148 (1909), No. 8, pp. 513, 514*).—This pulp, obtained in the process of preparing sisal fiber in Yucatan, was found to contain when air-dried 12.11 per cent of ash, 3.79 per cent of nitrogen, 0.16 per cent of phosphoric acid, 1.22 per cent of potash, and 3.57 per cent of lime, showing that the material has considerable value as a fertilizer. Analysis also showed 6.29 per cent of reducing sugars and 4.65 per cent of nonreducing sugars, which might be profitably utilized in the manufacture of alcohol.

The air-dried sisal fiber contained 8.02 per cent of ash, 1.78 per cent of nitrogen, 0.41 per cent of phosphoric acid, 1.06 per cent of potash, and 1.94 per cent of lime. These figures, taken in connection with those for the pulp, show that the draft of sisal on the fertility of the soil would be greatly reduced if the pulp were returned to the soil as a fertilizer.

Analyses and valuations of commercial fertilizers and ground bone, C. S. CATHCART ET AL. (*New Jersey Stas. Bul. 234, pp. 39*).—This bulletin supplements Bulletin 233 of the station (E. S. R., 24, p. 428) and discusses the results of inspection for 1910 as a whole.

The total number of samples of fertilizing materials examined during the year was 803, representing 370 dealers. The average amount of nitrogen found in 520 brands of fertilizers was 2.52 per cent, the amount guarantied being 2.46 per cent; the amount of phosphoric acid found was 7.4 per cent, the amount guarantied 7.41 per cent; and the amount of potash found was 6.58 per cent, the amount guarantied 6.07 per cent. The number of deficiencies found in these fertilizers was 51 of nitrogen, 142 of phosphoric acid, and 45 of potash, representing 15.3 per cent of the total possible number of deficiencies.

AGRICULTURAL BOTANY.

A text-book of general bacteriology, W. D. Frost and E. F. McCampbell (*New York, 1910, pp. XVII+340, figs. 61*).—This is a brief but comprehensive text on general bacteriology designed for college classes. It includes a study of the morphology of bacteria, methods used in their study, their taxonomy and general physiology, the biology of specialized groups such as the prototrophic, chromogenic, photogenic, zymogenic, saprogenic, saprophilic, pathogenic bacteria of animals and plants, and the distribution of bacteria, including bacteria of the soil, air, water, sewage, milk, and of the human body.

Review of agricultural bacteriology, E. Kayser (*Bul. Mens. Off. Renseig. Agr. [Paris], 9 (1910), No. 10, pp. 1150–1160*).—A review is given of recent publications by various investigators on humification, soil fatigue, nitrification, denitrification, purification of sewage waters, nitrogen fixation, and the inoculation of seeds with cultures of tubercle bacteria.

Bacteria in frozen soil, H. J. Conn (*Centbl. Bakt. [etc.], 2. Abt., 28 (1910), No. 16–19, pp. 422–434, dgms. 2*).—The results are given of the bacterial count from samples of soil taken to a depth of from 15 to 18 cm. from April, 1909, to April, 1910, at Ithaca, N. Y. Very dilute soil suspensions from these samples were plated on a 12 per cent gelatin medium and incubated at from 19 to 20° C. for 7 days before the counts were made.

Quantitative determinations by means of the plate method showed the presence of large numbers of bacteria during the winter in the soil samples. When the soil was completely frozen there seemed to be a rapid multiplication in the numbers of bacteria, greater than any found during the summer or fall. In general, the number seems to vary with the moisture content of the soil, but the rapid multiplication during the winter was an exception to this rule. There were indications that the bacterial flora of the soil consist of two groups, one flourishing in the winter, and the other in the summer.

Variability in Bacillus prodigiosus, M. W. Beijerinck (*K. Akad. Wetensch. Amsterdam, Versl. Wis en Natuurk. Afdeel., 18 (1909–10), pt. 2, pp. 596–605; K. Akad. Wetensch. Amsterdam, Proc. Sect. Sci., 12 (1909–10), pt 2, pp. 640–649*).—The author gives the methods used in obtaining some 14 variants of *B. prodigiosus* and their salient characters.

It is claimed that *B. prodigiosus* produces both gain and loss variants, all obtained with certainty by actual experiments, in which the same culture will contain the stock-form unchanged, as well as the variants. By rapidly repeated reinoculations and by other methods the normal form and variants may be kept constant apparently for an unlimited length of time. These variants differ from each other and from their stock-forms in the same way as closely related natural species or varieties do from each other.

The bacterial flora as a factor in the unproductiveness of soils, A. Dachnowski (*Ohio Nat., 10 (1910), No. 6, pp. 137–145, figs. 2*).—In a contribution from the botanical laboratory of the Ohio State University the author gives the results of experiments on the toxin-producing power of pure cultures of bacteria isolated from the bog water from the uppermost layer (1 ft. deep) of soil from Cranberry Island at Buckeye Lake, Ohio.

The physiological tests were made in half-liter Mason jars containing 500 cc. of inoculated solutions obtained by inoculating sterilized solutions of bog water and peat with pure cultures of the isolated bog bacteria, and with a mixture of bacteria found in 1 cc. of fresh bog water. Check experiments were also carried on with sterilized uninoculated solutions and with normal untreated bog water. All flasks were incubated from 2 to 6 weeks prior to the physiological tests, and then in these solutions wheat seedlings from 4 to 5 cm. high were grown for 15 days under greenhouse conditions of uniform temperature and light. The growth of the wheat seedlings in the various cultures was measured by the transpiration relative to the control cultures, and the water loss was reported every fifth day. It is claimed that when the bacteria are omitted from the sterilized solutions no evidence of toxicity is noticeable for the wheat seedlings, but that when grown in the inoculated culture media there is an active stimulation or depression of the normal functions of the plants.

Experiments are also reported on the ability of micro-organisms to convert soluble proteids into amido-acids and allied products from the decomposition of proteids, in which sterilized solutions of bog water and peat were used as culture media to which sufficient peptone was added to produce a 1 per cent peptone culture. The cultures were tested physiologically after a 2-weeks incubation by growing wheat seedlings in them for 5 days, at the end of which time transpiration, growth, and the green and dry weight of the plants were found to be proportionately reduced.

It is claimed that the retardation in growth of the wheat plants is not caused by physical or chemical conditions, but through the direct activity of the bacterial flora, and that reciprocal relations may exist between groups of soil bacteria and the plants grown upon the soil. The injury to cultivated crops by weeds or previous crops may be due to influences on the bacterial life of the soil unfavorable to succeeding agricultural crops.

The decomposition of uric acid by bacteria, F. LIEBERT (*K. Akad. Wetensch. Amsterdam, Versl. Wis en Natuurk. Afdeel., 17 (1908–9), pt. 2, pp. 990–1001, pl. 1; K. Akad. Wetensch. Amsterdam, Proc. Sect. Sci., 12 (1909–10), pt. 1, pp. 54–64, pl. 1; abs. in Bot. Centbl., 114 (1910), No. 14, pp. 361, 362*).—It was found that in the decomposition of uric acid by aerobic bacteria the acid was broken up into carbon dioxid, ammonia, and the intermediate products allantoin, urea, and oxalic acid.

These bacteria belong to two groups, viz, those which flourish in slightly acid or neutral media, such as *Bacillus fluorescens liquefaciens*, *B. fluorescens nonliquefaciens*, and *Bacterium calco-aceticum*, and those which grow only in alkaline media, such as *Bacterium odoratum* n. sp. and *Urobacillus musculi* n. sp. When the uric acid forms the carbon source for the bacteria, then *Bacillus pyocyaneus* and *B. stutzeri* in the presence of nitrate of soda produce denitrification. In complete anaerobic cultures the uric acid was decomposed by *B. acidi urici* n. sp., a spore-forming motile obligate anaerobe which splits the acid into carbon dioxid, ammonia, and acetic acid.

The mobilization of the phosphoric acid in soils under the influence of bacterial activity, S. A. SEWERIN (*Centbl. Bakt. [etc.], 2. Abt., 28 (1910), No. 22–24, pp. 561–580*).—The results are given of experiments in bouillon flask cultures to which tricalcium phosphate had been added, on the changes in phosphoric acid and the production of carbon dioxid.

A series of sterilized cultures was compared with another series which had been inoculated with earth rich in different micro-organisms and then incubated at 30° C. for 15 days. It was found that under the conditions of the experiments the biological processes played a negative rôle, although the amount of easily soluble phosphoric acid in the culture medium was materially lowered even when an abundant formation of carbon dioxid indicated the activity of the soil micro-organisms present.

This decrease in easily soluble phosphoric acid was due to its consumption by the bacteria and also to pure chemical reactions which finally transformed the easily soluble phosphoric acid into a less soluble form. This does not imply that the transformation of the less soluble phosphoric acid compound into the more soluble does not occur in the culture medium, but that this process is slower than the opposite one of transforming the more soluble into the less soluble form.

Under the conditions of the experiments the formation of carbon dioxid reached its maximum in the first 5 to 10 days of the cultures.

Experiments with green manure seed by inoculation with Professor Bottomley's nitro-bacterine culture, H. T. EASTERBY (*Ann. Rpt. Bur. Sugar Expt. Stas. [Queensland], 1910, pp. 10, 11*).—The results of experiments with this nitro-bacterine culture are reported for the Iron Age cowpea, small red Mauritius bean, and large black Mauritius bean.

The yield of fodder from the inoculated seed showed a gain of 1.37 tons per acre for the Iron Age cowpea and of about 0.5 ton per acre for the red Mauritius bean, while the large black Mauritius bean, on the contrary, showed a gain of 1.62 tons per acre in favor of the uninoculated seed.

Analyses of the samples from the inoculated and uninoculated crops showed a decided advantage in using the culture, as the percentage of nitrogen was uniformly higher in the inoculated than in the uninoculated crop.

The place in which nitrates are utilized by plants, C. ACQUA (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 19 (1910), I, No. 6, pp. 339–344; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 572, II, p. 533*).—The author states that wheat treated with a solution of a radioactive salt, such as uranyl nitrate, and then germinated revealed by the electroscopic method an accumulation of active material in the apex of the roots. Upon microscopic examination of the tissues there was found an insoluble yellow deposit, probably uranic oxid, in the dermatogen near the apex, and in prolonged cultures it was also present in the adjacent lower layers of tissue. As this deposit is formed by uranyl nitrate and scarcely at all by other uranium salts, the author regards the phenomenon as due to the decomposition of the nitrate with utilization of the nitrogen by the plant, and consequent deposition of the oxid.

Uranium being generally injurious in its action to plants, preliminary experiments were carried on with manganous nitrate solutions on wheat and beans. The results given were similar to those described above, an insoluble black deposit being formed near the root tips.

Protein formation in ripening seeds, E. SCHULZE and E. WINTERSTEIN (*Ztschr. Physiol. Chem., 65 (1910), No. 5–6, pp. 431–476; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 578, II, p. 644*).—A study of the ripening of leguminous seeds showed a considerable increase in the percentage of proteids, while the nonproteid nitrogen diminished. In the case of beans (*Phaseolus vulgaris*), no absolute decrease in nonproteid nitrogen was observed. Peas, however, showed a loss of nonproteid nitrogen during ripening, but not enough to account for the increase of proteids.

In examining the hulls of peas and beans, they were found to contain, in addition to considerable asparagin, small quantities of a number of nonproteid nitrogenous compounds, cholin, and trigonellin. The nonproteid nitrogenous compounds were very similar to those supplied to leguminous seedlings from the cotyledons.

Unripe pea seeds were found to contain very little asparagin, but they contained glutamin, which has not yet been detected in the hulls. The authors suggest that asparagin migrates from the hulls to the seeds, where it is rapidly utilized for the production of proteids, and that glutamin may also be present in the hulls and pass into the seeds, where it accumulates.

A study of wheat showed that in milk-ripe wheat seeds only very small amounts of nonproteid nitrogen could be detected. Monamino fatty acids were found, and arginin seemed to be present, but no asparagin was found.

Unsuccessful attempts were made to detect in the unripe seeds of peas and beans an enzym capable of producing ammonia from asparagin.

The rôle of the endodermis in the absorption of salts in the plant, J. DE RUFZ DE LAVISON (*Rev. Gén. Bot., 22 (1910), No. 258, pp. 225–241, figs. 6*).—A study has been made of the rôle of the endodermis of the root in relation to the absorption of certain salt solutions by the plant. Two types of roots were experimented with—peas, which have no suberized endodermis, and hyacinths, which have a well differentiated suberized endodermis. Solutions were employed some of which are unable to penetrate living protoplasm and others which penetrate both cellulose and protoplasm.

Ammonium sulphocyanid was found not to be arrested but to penetrate the living protoplasm. This same property is possessed by many salts, especially nitrates, alkaline chlorids, etc. On the other hand, iron sulphate does not penetrate beyond the endodermis, the suberized tissues of which retard it. Other solutions are more or less absorbed by the cortex but do not penetrate to the living part of the root.

The selective rôle of roots in the absorption of salts, J. DE RUFZ DE LAVISON (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 16, pp. 675–677*).—In continuation of the experiments described above, the author tested the absorptive power of stems with and without roots, and as a result of his investigations he claims that stems absorb solutions indiscriminately, the roots alone seeming to possess a selective power toward certain salts in solution.

The influence of some artificial oxydases and of some metallic compounds on the growth of wheat, V. NAZARI (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 19 (1910), II, No. 7, pp. 361–367*).—The author reports a study on the germination of wheat in the presence of manganese dioxid, of iron sesquioxid, of both with organic matter added, and of an artificial oxydase, as well as the yield in grain as influenced by the presence of oxids of manganese and iron. The grains in each case were rolled in a paste of the respective substances, then planted, and the rate of germination and yield recorded.

The seeds rolled in the artificial oxydase showed the greatest energy in germination; those in the presence of the manganese had an appreciable acceleration; the presence of organic matter decreased the action of the manganese; while the other two substances had no influence on germination.

The seeds treated with the manganese paste gave an increased yield both in straw and grain over the check plats, while those treated with sesquioxid of iron paste showed no gain.

The resistance of wheat and barley grains to poisons, with special reference to seed sterilization, H. SCHROEDER (*Centbl. Bakt. [etc.], 2. Abt., 28 (1910), No. 16–19, pp. 492–505*).—A brief review is given of the results obtained by different investigators on the effects of certain disinfectants on the germination of the seeds and the relationship of the seed coat as to permeability, etc., to the poisonous action on the embryo of the grain of the germicides used.

The author reports the results of experiments on the action of ether, alcohol, and chloroform on the germination of hulled and unhulled grains; on the effects of various strengths of alcoholic solutions on germination; and on the germicidal action of silver nitrate when used in seed disinfection and its effects on the germination of the treated grain.

In the experiments with the silver nitrate, the seeds of wheat and barley were soaked in a 5 per cent solution of silver nitrate for from 18 to 24 hours, and then thoroughly washed in a weak solution of common salt. This treatment, it is claimed, completely destroyed all the external spores of fungi and bacteria on the grain, but did not appreciably injure the vitality of the seed provided the seed coats were sound and unbroken.

The influence of temperature on the respiration of higher plants, J. Kuyper (*Rec. Trav. Bot. Néerland., 7 (1910), pp. 131–240, pls. 3, figs. 12; abs. in K. Akad. Wetensch. Amsterdam, Proc. Sect. Sci., 12 (1909–10), pt. 1, pp. 219–227, pl. 1, figs. 4*).—The author has investigated the influence of temperature on the respiration of some of the higher plants in order to test the theory of Blackman and Matthaei regarding the limiting factors of respiration (E. S. R., 17, p. 234). The experiments were made with pea, wheat, and lupine seedlings, and the carbon dioxid liberation was taken as a measure of respiration.

In general the limiting factor of temperature was found to hold good, as described by Blackman, but some fluctuations were noted. The author found that the temperature at which the harmful effect arises is higher when the starch content is higher and lower in proportion as the protein content is increased. There is believed to be an indication that the course of respiration depends upon the presence of proteolytic or diastatic enzyms. The falling off of respiration at a lower temperature in seeds with a high protein content is believed to be connected with the fact that the optimum for proteolytic activity generally lies lower than for diastatic action.

Studies on the influence of low temperatures on plant cells, E. Schaffnit (*Mitt. Kaiser Wilhelms Inst. Landw. Bromberg, 3 (1910), No. 2, pp. 93–115, figs. 2*).—The effects of low temperatures on the cell sap, chemical constituents, enzyms, physical changes, and death points of green plants, spores, and pollen grains are discussed.

It is claimed that temperatures near the freezing point produce in plant cells chemical products which represent a transition of the less stable compounds into the more stable forms and have a certain economic significance.

The death point of plants from cold varies according to the type of plant or organ. For those to whose constitution and existence water is an absolutely essential factor, the abstraction of water is the primary cause of death, while chemical and physical changes produced by low temperatures may be considered as secondary factors. For plants and plant organs which can and do exist for long periods without much water, such as lichens, mosses, seeds, spores, etc., the death point varies for each individual case.

The conclusion is therefore reached that for a given temperature death results from vital reaction processes called forth by the external influences.

Contribution to the knowledge of water secretion in plants, W. Burck (*K. Akad. Wetensch. Amsterdam, Proc. Sect. Sci., 12 (1909), pt. 1, pp. 306–321; 400–417*).—In a previous paper (E. S. R., 22, p. 329) the author pointed out the biological significance of the secretion of nectar in flowers. The investigations upon which these conclusions were based led to an examination of water secretion from different surfaces of the plant.

The current belief is that many herbaceous plants and shrubs secrete drops of water during the night and early morning, due to the root pressure. The author has examined a considerable number of plants representing many species and arrives at the conclusion that in considering the secretion of water on the surface of the plant we must not only take into account the formation of drops which result directly from root pressure, but also that which is brought about on the apex and margin of the leaves and the leaf surfaces as a result of the action of glands. In many cases these glands are originally mucilage cells, but in other cases they are really water glands.

In the second part of the paper the author considers the secretion of water in flowers, and arrives at the conclusion that liquids are secreted not only by the leaves but also in various parts of the flower. In his former conclusions he considered the secretion of water in the flower bud as a useful arrangement to protect the enclosed parts of the flower against desiccation, but as a result of the later investigations he claims that the secretion by the glands of the calyx and corolla is less exposed to evaporation in the closed calyx and consequently collects there. In other words, the secretion of the water in the flower bud did not originally arise because it was useful to the plant, but it may be of advantage where the enclosed parts of the flower or fruit are exposed to the danger of desiccation.

The significance of mucilage in the germination of seed, C. RAVENNA and M. ZAMORANI (*Atti. R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 19 (1910), II, No. 5, pp. 247–252*).—Attention is called to the presence of mucilage in the seeds of a number of species of plants, and an account is given of experiments carried on by the authors with flaxseed to determine the function of the mucilage.

When the mucilage was removed from germinating seed, the seedlings produced showed less fresh and dry weight and a lower ash content than normally. If, however, the mineral substances and carbohydrates represented by the mucilage were artificially supplied to the seed, the development proceeded as in normal germination.

It is claimed that the mucilage serves as a reserve material and that it is utilized during germination.

On the formation of hydrocyanic acid in germinating seed, C. RAVENNA and M. ZAMORANI (*Atti. R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 19 (1910), II, No. 7, pp. 356–361*).—A summary is given of recent investigations on the presence of hydrocyanic acid in germinating seeds, notably in the seeds of *Phaseolus lunatus*, *Sorghum vulgare*, and *Linum usitatissimum*.

Experiments with etiolated plants and with seedlings grown in an atmosphere free from carbon dioxid showed the presence of less hydrocyanic acid than when the seedlings were grown under normal conditions. This indicates, it is claimed, that carbohydrates play an important part in the formation of hydrocyanic acid.

On the occurrence of the wild form of sugar beet, E. VON PROSKOWETZ (*Ztschr. Ver. Deut. Zuckerindus., 1910, No. 657, II, pp. 987–1003, pls. 4*).—An account is given of a wild form of beet found growing along the rocky coasts of the Gulf of Quarnero of the Adriatic Sea. This plant, the author claims, is the original species from which the cultivated beet was derived.

The behavior of pure line cultures of Glomerella, C. L. SHEAR (*Science, n. ser., 32 (1910), No. 831, p. 808*).—In a paper read before the sixty-fourth regular meeting of the Botanical Society of Washington, the author reports the study of pure line pedigreed cultures of a species of Glomerella obtained from an acervulus on a leaf of the avocado (*Persea gratissima*). Twenty-three successive generations were grown from this culture and carefully compared with each other. Single ascospore cultures obtained in the same manner from the same initial cultures were studied through 7 generations.

Variations in all the characters of the organisms occurred, especially in the conidial and perithecial fructifications. Some of the characters after being transmitted for several generations either suddenly or gradually disappeared, to reappear in later generations.

As the physical, chemical, and biological environments of the organism were supposed to be the same, it seems probable that some of these sudden and striking variations should be referred to other factors than those of environment.

FIELD CROPS.

Farm crops, C. W. Burkett (*New York, 1910, pp. XI+272, pls. 7, figs. 66*).—The author devotes several chapters to the relation of crops to soils, rotations, preparation of seed bed, cultivation, and plant breeding. Other chapters suggest the best crops for feeding different classes of animals and for forage succulence, silage, and soiling. Nearly two-thirds of the work is devoted to a final chapter on the production of individual crops. Alphabetical arrangement is used here. The text and illustrations are entirely instructional in character.

[Preliminary test of dry farm cropping, and tests of oats, wheat, and barley,] L. B. M'Wethy and J. D. Towar (*Wyoming Sta. Rpt. 1910, pp. 39–43, 49, 55*).—These pages give a brief progress report of plant breeding work with alfalfa and cereals.

Many imported alfalfa seeds "failed entirely either to germinate or to withstand the winter," but many others give promise of success and superiority over the common alfalfas. In a test of 14 oat varieties Lincoln and New Market produced the highest yields of 88.5 and 82.3 bu. per acre, respectively, and were among the earlier maturing varieties used. In milling and baking tests of Medeale and John Brown spring wheats and Turkey Red winter wheat, the flour percentages were 65.6, 64, and 68.8, respectively, the bran percentages 8.5, 14.8, and 23.4, the shorts percentages 23.1, 14.1, and 6.2, the percentages of loss in milling 2.8, 7.1, and 1.6, the wet gluten percentages 21.6, 44.4, and 34.8, and the loaf volumes 98, 158, and 115 cu. in.

Hail and frost necessitated the cutting of the barley crop for hay. The check plats and those to which nitrate of soda were applied at the rate of 300 lbs. per acre yielded 2,457 and 4,918 lbs. per acre, respectively, on fall plowed land and 1,944 and 4,286 lbs. on spring plowed land.

In a test of dry farming methods emmer sown at the rate of 30 lbs. per acre appeared promising, but was largely destroyed by gophers. Spring rye, durum wheat, and Colorado No. 50 spring wheat sown at the same rate yielded 6.4, 9, and 8.1 bu. per acre, respectively, while Kherson oats yielded about 30 bu. per acre, Strawberry potatoes 91 bu., and field peas 7.2.

Imperial Valley settlers' crop manual, J. E. Coit and W. E. Packard (*California Sta. Bul. 210, pp. 139–253, figs. 55*).—Discussions of the weather conditions, soils, irrigation problems, insect pests, and plant diseases in the Imperial Valley are followed by suggestions for the growing of 91 fruit, field, and garden crops. The crops are arranged alphabetically, and each is given a separate discussion. Weeds and ornamental plants are also dealt with.

[Experiments with summer crops], G. Valder (*Agr. Gaz. N. S. Wales, 21 (1910), No. 10, pp. 829–835, pl. 1*).—The author reports the results of variety and manurial tests on 36 farms of corn, cowpeas, and sorghums. American seed corn supplied by this Department was used.

[Variety and manurial tests with cane, rice, and cotton], J B. Harrison (*Rpt. Expt. Agr. Work Dept. Sci. and Agr. [Brit. Guiana], 1908–9, pp. 1–15, 21–27*).—The author gives a progress report for the period from April 1, 1908 to December 30, 1909, in which he states the weather conditions and rainfall during the period.

Trouble with damping off of sugar cane seedlings in rainy weather was largely obviated by using water containing 2 oz. of nitric acid per gallon. The average returns of over 6 crops of White Transparent and B 147 were 2.79 and 2.63 tons of sugar per acre, respectively. Fields that have grown Bourbon continuously since 1891 will only with difficulty produce this variety now. Its average yield of cane during 1905–1908 after D 78 was 22.5 tons per acre as compared with 15.8 after Bourbon. In the fifth rattoon crop, White Transparent and B 147 yielded 17.2 and 14.3 tons of cane per acre, respectively, on the no-nitrogen plats, 24.8 and 21.5 tons after an application of 200 lbs. of sulphate of ammonia, and 26 and 29.3 tons after an application of 400 lbs. of the sulphate. Similar results were obtained with the second and third rattoon crops of other varieties, the yields of Bourbon grown continuously being 1.3, 1.6, and 4.7 tons of cane per acre respectively on the no-, low-, and high-nitrogen plats.

On plats that have been receiving nitrogen continuously for 16 years, puddling from the use of nitrate of soda seems more likely to prove injurious than the souring action of sulphate of ammonia. The substitution of the nitrate for the sulphate on the unlimed land was attended by a reduction of the increase due to nitrogen from 13.1 to 8.5 tons of cane per acre, while the reverse substitution "increased the excess yield over the not manured plats from 6.9 to 8.5 tons." On limed land these substitutions produced, respectively, a decrease from 13 tons to 6.7 tons per acre and an increase of 2.7 tons. The continuous use of nitrate of soda produced far more noticeable ill effects than that of sulphate of ammonia, especially in very wet seasons. Soils which have been fertilized continuously for 30 to 50 years with the sulphate gave an alkaline reaction in the majority of cases.

The average yields on no-phosphate and slag-phosphate plats were 23.7 and 26.2 tons of cane per acre, respectively. Other tests of phosphates gave negative results which the author regards as "possibly due to experimental error incidental to the comparatively small number (12) of comparisons made."

Tables show the results of these experiments and of trials of new varieties. These data are so grouped as to show the influence, if any, of the female parentage of the variety.

The plats were also arranged in such a way as to show the effects of the use of increasing proportions of nitrogenous fertilizer, especially sulphate of ammonia. Sixty lbs. of nitrogen in sulphate of ammonia and in nitrate of soda produced yields of 22.7 and 18 tons per acre, respectively, as compared with 14.4 tons on the no-nitrogen plat. With 11 varieties, the average yields after applications of 150, 300, and 450 lbs. of sulphate of ammonia were 19.3, 23, and 23.9 tons of cane per acre, respectively, as compared with 15.4 tons on the no-nitrogen plats. With 8 of the varieties, 375 lbs. per acre of nitrate of soda were used and gave lower results than either of the higher applications of sulphate. In another test of 14 varieties 300 and 450 lbs. of sulphate of ammonia were followed by average yields of 21 and 29.7 tons of canes per acre, respectively, as compared with 12.4 tons on the no-nitrogen plats.

Regarding the sugar yield of White Transparent as 100 on the Brickdam field, D 4397 of Bourbon parentage, D 790, D 1119, and D 1082 gave yields ranging from 151 to 185. B 208 gave juice rich in saccharose and high in purity, but was not high in field results. Studies are given of the color variants of B 208 and other varieties. Tables give the parentage, field yields, pounds of sugar per gallon, and tons of sugar per acre obtained, for each of a large number of the newer varieties tested.

In pot and plat experiments with nitrobacterine for sugar cane, negative results were obtained. When the highest probable errors due to soil and other differences were deducted, the increased yield of rice after phosphates had been used in former years was 5.1 per cent, after sulphate of potash and lime the preceding year 8.2 and 13.9 per cent, respectively, after sulphate of potash preceded by phosphates in former years 12 per cent, and after lime in 1908 preceded by phosphates in earlier years 11.5 per cent. Continuation of this experiment showed variations within the limit of probable soil error in all cases the following year. An application of 1 cwt. of sulphate of potash per acre gave no certain increase but the use of 2 cwt. apparently increased the yield 17.5 per cent.

Six rice varieties from Burma gave no yields of high promise. Six other varieties from British Honduras are described as having blackish, light colored, or ordinary grains, barley-shaped, and reddish grains, and gave yields ranging from 1,344 to 4,272 lbs. per acre. Among other varieties tested Nos. 3, 75 (Suthrà dhân), and Creole yielded 4,812, 4,728, and 3,948 lbs. per acre, respectively.

Attempts to obtain an artificial or controlled hybridization indicated a profusion of variants in carefully grown rice. The more promising varieties and the Creole kind seem to be freer from variants than others. The so-called barley rices were more variable than long-grain varieties. Notes are given on single and multiple planting of early ripening varieties.

Tests of Caravonica Silk, Mit-afifi, Egyptian, Sea Island, and other cottons have been abandoned because of failure to obtain sufficiently high yields to cover the cost of cultivation. Notes are given on the quantity and quality of the product of 6 varieties of cotton which are practically indigenous on the borders of the colony contiguous to the Brazilian frontier.

[Introductions of field crops], F. W. STRONG (*Rpt. Agr. Dept. East. Bengal and Assam, 1909–10, pp. 7–11*).—The author gives a progress report of experimental growings of newly introduced varieties of cotton, jute, potatoes, sugar cane, rice, oranges, wheat, oats, and barley.

Observations on the growth of nitrogen-collecting plants and nitrogen-using plants in mixed seedings, TACKE (*Ztschr. Moorkultur u. Torfverwert., 8 (1910), No. 5, pp. 233–236*).—The Moor Experiment Station has found in experiments on highmoor soil that it is unnecessary to apply nitrogen if adequately drained soil is carefully prepared and limed or marled and enough clover be sown in the mixture. For a series of years it has been observed that grass does better when sown with clover even during the first season. Both sorrel (*Rumex acetosella*) and heather did well on highmoor soil when not crowded by competing plants. They did equally well on plats to which 4,000 and 9,000 kg. of lime were added as marl.

On lucerne; with notes on some other leguminous crops, B. DYER (*New Zeal. Dairyman, 14 (1909), No. 3, pp. 60–62; 14 (1910), No. 4, pp. 17–20*).—The author has collected and presented in tabular and descriptive form the results of work on the efficiency of alfalfa and other legumes as nitrogen gatherers. He includes the work of Atwater, Hellriegel, Wilfarth, and others, and that done at Rothamsted and at the Woburn Farm.

On the measurement of correlation with special reference to some characters of Indian corn, H. L. RIETZ and L. H. SMITH (*Illinois Sta. Bul. 148, pp. 291–316, figs. 3*).—The writers briefly explain the nature and use of the correlation table and the correlation coefficient, the methods of computing the coefficient, or *r*, the probable error and the regression coefficient. References are given to other publications in which these methods are more fully explained and used. They are also applied to some characters of Indian corn, grown experimentally for other purposes, and previously reported (E. S. R., 20, p. 531).

For the second year rotation corn, the correlation values of length to circumference center about 0.43 and range from 0.203 to 0.623 for high and low yields, illustrating a general tendency in this direction. The correlation between length and number of rows was usually insignificant. "In circumference and rows, . . . extremes presented are 0.425 and 0.608 . . . in length and weight of ears, the mean value of the correlation is 0.810 in 1909 . . . in weight and rows of kernels, we have values from 0.178 to 0.345, in weight and circumference we have values from 0.648 to 0.840."

In the Illinois corn of the low protein series crop of 1907, the mechanically selected low protein seed showed values of r for length and circumference ranging from 0.203±0.021 to 0.462±0.018. The values of r for length and rows were −0.044±0.024 and +0.007±0.024, those for circumference and rows from 0.432±0.018 to 0.454±0.016, those for length and weight 0.781±0.008 and 0.786±0.009, those for rows and weight 0.223±0.024 and 0.275±0.023, and those for weight and circumference 0.721±0.011 and 0.768±0.009. The high protein seed crop of 1909 showed values of r for length and circumference ranging from 0.344±0.017 to 0.590±0.014, those for length and rows from 0.061±0.026 to 0.120±0.027, those for circumference and rows from 0.432±0.022 to 0.608±0.017, those for length and weight 0.871±0.005 and 0.855±0.006, those for rows and weights 0.345±0.021 and 0.348±0.021, and those for weight and circumference 0.763±0.009 and 0.771±0.009. The low protein seed crop for 1909 showed values of r for length and circumference ranging from 0.409±0.019 to 0.539±0.012, those for length and rows from −0.044±0.026 to 0.027±0.034, those for circumference and rows from 0.425±0.018 to 0.524±0.020, those for length and weight from 0.785±0.008 to 0.844±0.008, those for weights and rows from 0.212±0.029 to 0.229±0.027, and those for weight and circumference from 0.648±0.013 to 0.840±0.007. The correlations among certain characters of high and low protein and high and low oil ears of Illinois corn of the crops of 1907, 1908, and 1909 are also stated.

On the measurement of correlation with special reference to some characters of Indian corn, H. L. Rietz and L. H. Smith (*Illinois Sta. Bul. 148, Abs., pp. 8*).—This is a popular edition of the above.

American corn-growing methods in Russia, J. H. Grout (*Daily Cons. and Trade Rpts. [U. S.], 1911, No. 14, pp. 216, 217*).—The consul gives a progress report of the results of the introduction of American seed and corn-growing methods by L. G. Michael, formerly of the Iowa Experiment Station. Figures cited indicate that Bessarabian soil and rainfall should produce 60 bu. of corn per acre, but that the actual averages are 14.9 bu. on peasant farms and 18 bu. on large estates.

Standard types of Rhodesian maize and their points, H. G. Mundy (*Rhodesia Agr. Jour., 7 (1910), No. 6, pp. 1481–1486, pls. 2*).—The author gives the measurements and weights of Hickory King, Salisbury White, Boone County, and Golden Eagle corn as exhibited at the shows, suggests the weight of ear, kernel, and cob likely to give the best yield of grain per ear, and gives a score card.

Chou Moellier, A. J. Pinn (*Agr. Gaz. N. S. Wales, 21 (1910), No. 9, pp. 793, 794, fig. 1; abs. in Natal Agr. Jour., 15 (1910), No. 5, p. 647*).—Chou Moellier sown in drills June 16, 1909, stood 5 ft. high and was still growing, in spite of a very dry season, a year later. The area harvested yielded 27 tons 17 cwt. of foliage in addition to 38 tons 18 cwt. of stems per acre. The stems were eaten only by pigs, but all stock relished the foliage. The younger leaves could be used as a vegetable. No special qualification aside from quantity of feed recommends Chou Moellier above Thousand-headed kale.

The root development of cotton plants in different soils, H. A. Tempany (*West Indian Bul., 11 (1910), No. 1, pp. 68–71*).—The author presents in tabular form the length of the tap root, maximum spread of lateral roots, circumference of the stem at the soil surface, and the total number of main lateral roots of Sea Island cotton grown in various soils.

Manurial experiments with cotton in the Leeward Islands, H. A. TEMPANY (*West Indian Bul., 11 (1910), No. 1, pp. 60–67*).—Tables state the amount of fertilizer applied and the yields of Sea Island cotton obtained on plats in which nitrate of soda, sulphate of ammonia, sulphate of potash, basic phosphate, cotton-seed meal, salt, and sulphate of copper were used as the plant food sources.

The largest increase, 311 lbs. of seed cotton per acre, followed the application of sulphate of ammonia, sulphate of potash, and superphosphate. Increased yields of more than 100 lbs. of seed cotton per acre followed applications of nitrogen. The author concludes that artificial fertilizers are unremunerative on his soils, and suggests the use of natural and green manures.

Supply and distribution of cotton, D. C. ROPER (*Bur. of the Census [U. S.] Bul. 110, pp. 32, dgms. 2*).—An earlier bulletin of this series (E. S. R., 22, p. 445) contains similar data and discussions. Tables present statistical data on the imports, exports, and distribution of cotton during the year ended August 31, 1910, cotton statistics for earlier periods, mainly since 1890, and the world's production of cotton, wool, silk, flax, hemp, and jute by countries in 1909, 1899, and 1889

Manurial experiments on oats at Coates, 1910, B. SWANWICK and E. KINCH (*Agr. Students' Gaz., n. ser., 15 (1910), No. 2, pp. 43, 44*).—Ammonium sulphate, nitrate of soda, nitrate of lime, and calcium cyanamid were used in sufficient quantities to supply the amount of nitrogen found in 1 cwt. of ammonium sulphate. The check plat yielded 43 bu. of oats and 16¾ bu. of straw per acre. The highest straw yield, 20¾ cwt., followed the use of sulphate of ammonia. The highest grain yields, 53½ and 57½ bu. per acre, respectively, followed calcium cyanamid and nitrate of lime.

Peanuts in Hawaii, F. G. KRAUSS (*Hawaii Sta. Press Bul. 28, pp. 11, pls. 2*).—This bulletin discusses the uses of peanuts and reports the cost of growing in Hawaiian experiments as about $55 per acre. The principal data reported are stated in the following table:

Results of station and cooperative planting of peanuts during 1908–10.

Variety.	Average yield of nuts.		Days to maturity.	Peanuts in pod per pound.		Value per acre.
	Per acre.	Per plant.		Imported.	Third Hawaiian generation.	
	Pounds.	*Number.*				
Spanish	1,728	145	168	759	444	$98.00
Bunch Jumbo	1,881	184	158	352	226	87.00
Running Jumbo	2,077	208	158	345	232	100.80
Virginia Creeping	2,063	219	157	325	245	105.60
Bunch Virginia (Sport)	2,249	190	173	....	228	....

The status of the potato growing industry in Ohio.—Seasonal notes on potatoes, F. H. BALLOU and J. H. GOURLEY (*Ohio Sta. Bul. 218, pp. 559–603, figs. 12*).—The authors discuss rotations and soil preparation for potato growing, northern and home-grown seed, and sun-sprouting as a means of preservation and preparation for planting, and spraying for insects and fungi, and report tests of different quantities of seed, seed selection and improvement, and treating potatoes for scab. A seasonal report for 1909 is appended.

Two years' experiments indicate that planting at the rate of 15 bu. per acre gives in general greater gains than when 10, 25, or 40 bu. of seed is used. "In every case the tubers grown from the one- and two-eye seed pieces, while somewhat less in number, average far above those grown from the heavier rates of seeding." "The marketable quantities from the small seed tubers compared well with the marketable quantities from the different rates of seeding from large tubers," but were made up of noticeably smaller tubers.

Directions are given for use in conducting tuber-row and hill-row tests. In such tests, selected and unselected strains of Carman No. 3 yielded at the rates of 181.9 and 116.15 bu. per acre, respectively. Blight resistant and nonresistant strains of Whiton White Mammoth yielded at rates of 206.9 and 153.5 bu. per acre, respectively. The resistant rows were growing vigorously when killed by frost, but the nonresistant plants had already been dead 3 weeks. Higher yields are not attributed by the writer to mere length of growing season. Comparison of late growing hills of Carman No. 3 with those which ripened many days earlier showed that "in not a single case was the product of a late growing individual hill found to be greater or better in any way than equally vigorous hills which had more promptly closed their season of growth." The use for seed of small potatoes of inherent inferiority is strongly condemned.

Sun-sprouted seed, dropped with sprouts up and sprouts down and at random, averaged 93, 71, and 78 respectively, in germination percentage. "If dropped by the planter, the work is not likely to be done satisfactorily." Stock which had been raised from sun-sprouted seed and common stock, planted side by side, averaged 195.4 and 172.3 hills per 272 ft. row, yielded 86.4 and 64.6 lbs. per row, and showed germination percentages of 90 and 79.3. The product of the sun-sprouted seed kept firmer both in storage and in the sunlight, and was slower to sprout.

Untreated, formalin soaked, and formalin fumigated seed averaged 58.5, 16.7, and 18.4 per cent, respectively, of scabby potatoes in the crop. It was not observed that the vitality of treated seed was in any case lower than that of the untreated seed.

Average yields show that during 15 years in tests of acid phosphate, muriate of potash, and nitrate of soda, singly and in 8 different mixtures, the highest net profit followed the use of 160 lbs. of acid phosphate, 100 lbs. muriate of potash, and 80 lbs. of nitrate of soda per acre, although 160 lbs. acid phosphate alone producted its results at the lowest cost per bushel of increase.

The wilt-resistant qualities of each of 73 potato varieties are indicated.

Potato fertilizers: Methods of application and form of nitrogen, W. H. Jordan and F. A. Sirrine (*New York State Sta. Bul. 327, pp. 283–304*).—In a comparison of drilling and broadcasting fertilizers, the gains were "small, but consistent, in favor of application in the drill, with an average increase in large potatoes for the 3 localities and 8 comparisons, of 7.3 bu. per acre."

The authors conclude from a comparison of nitrate of soda and dried blood that, under the climatic conditions prevailing during the time of these tests, there is no dependable difference between these forms of nitrogen for potatoes on Long Island. "The data also show that amounts of high-grade fertilizer up to 1,000 lbs. to the acre will give profitable returns in good potato years, but that more than 1,000 lbs. is seldom justified."

Potato experimental fields, 1909–10, G. Seymour (*Jour. Dept. Agr. Victoria, 8 (1910), No. 11, pp. 711–723*).—Chemical and mechanical analyses of the soil are followed by tables stating the moisture content of pasture and other lands and the yields of potatoes secured at different points after uniform series of fertilizer applications at each experiment center.

Yields of 3, 4, and 10 tons per acre, respectively, were secured on a field cropped 40 years without manure, a well-manured field, and a field that had been in grass for more than 20 years. Sprouted seed yielded an average of 2 tons, 3 cwt., and 2 quarters more than unsprouted seed, except in the case of one variety which was attacked by disease. The author reports that in an earlier season when the plants were cut down twice by frost "the sprouted seed gave a very heavy increase amounting in some varieties to 5 tons per acre." Cut seed yielded an average of 1 ton 10½ cwt. more than whole seed and had an advantage of 10.6 in the percentage of small potatoes. Plantings of full and deep crowned seed produced yields showing 80 and 60 per cent, respectively, of full crowns, and the author regards the result as showing "that all that can be claimed for selection is that the percentage of objectionable tubers can be kept down but not eliminated altogether." Numerous tables present other results of these investigations, the general purpose of which was to determine the influence of pasture and artificial manures in the renovation and restoration of soils.

Comparative respiration experiments with different varieties of potatoes, J. F. Hoffmann and S. Sokolowski (*Ztschr. Spiritusindus., 33 (1910), Nos. 33, pp. 391–393, figs. 6; 34, pp. 404, 405; 35, pp. 416, 417, 421; 36, pp. 432, 433; 37, pp. 445, 451; 38, pp. 462, 465, 466; abs. in Monatsh. Landw., 3 (1910), No. 11, pp. 357, 358*).—Tables show the protein and nitrogen content of samples of the different varieties of potatoes experimented with, and extensive studies are given of the rate of development of carbon dioxid in each variety at different seasons, temperatures, and relative humidity.

The authors conclude that water and nitrogen content are not invariable in their influence on the respiration of potatoes as in the case of grains. Potatoes with high water and protein content may be lower in respiration than those low in water and protein. The results may be irregularly influenced by bacterial activities and resistance due to the character of the skin. Varieties with strong respiration are usually low in keeping quality, but when the reverse is true the result is attributed to the skin. Small potatoes were stronger in respiration than large ones, due to variation in the extent of the surface exposed.

The respiration of the same tubers varied with the season but it was not clearly established whether physiological or bacteriological conditions determined this variation. The effect of fertilization with saltpeter on the respiration and keeping qualities was not constant. There was an evident difference in the effect of temperature on the different varieties but it was so low as to be obscured by bacterial action. Practically no difference appeared in the degree of selfheating of the varieties and experiments on this point are to be repeated under different conditions with 100-kg. samples. The varieties varied among themselves in development of carbon dioxid, content of water and protein, character of skin, and keeping qualities. High water and protein content and rapid development of carbon dioxid usually accompanied low keeping qualities and conversely, but this rule had marked exceptions. The authors regard further experiments in other seasons as desirable for the verification of these results. The use of sterilized tubers is suggested.

Comparative test of rice varieties, J. E. Van Der Stok (*Teysmannia, 21 (1910), No. 2, pp. 111–117; abs. in Bot. Centbl., 114 (1910), No. 17, p. 447*).—The author discusses the results of tests of 24 varieties of rice. Tables state the period required for maturity, yield of straw and paddy, and ratio of straw to paddy for most varieties. The break percentages and percentages of light kernels and of grain obtained from the air-dry paddy of several varieties are also stated.

Sea salt in sugar beet production, A. DAMSEAUX (*Jour. Soc. Agr. Brabant et Hainaut, 55 (1910), No. 48, pp. 1175, 1176*).—Each of the 7 plats of the experiment received 30,000 kg. of barnyard manure and 300 of superphosphate. The check plat so treated yielded 5,990 kg. of sugar per hectare as compared with 6,170 on that which received 200 kg. of nitrate of soda in addition. Plats treated with (1) 200 kg. of nitrate of soda and 100 kg. of sea salt, and (2) 150 kg. of sulphate of ammonia and 100 kg. of sea salt produced yields of 6,050 kg. per hectare each. Plats treated with (1) 100 kg. of nitrate of soda and 100 kg. of sea salt, (2) 75 kg. of sulphate of ammonia and 100 kg. of sea salt, and (3) 150 kg. of sea salt yielded 6,160, 6,200, and 6,040 kg. of sugar per hectare, respectively. The application of a moderate quantity of the salt did not injure the quality of the product.

[Variety and manurial experiments with sugar cane], R. R. HALL and J. R. BOVELL (*Rpt. Agr. Work Barbados, Imp. Dept. Agr. West Indies, 1907–1909, pp. 4–109*).—Earlier results have been previously noted (E. S. R., 22, p. 536).

All experimental plats at the Dodds Botanic Station received 20 tons per acre of manure in addition to the artificials reported. All plats of the nitrogen series received 80 lbs. of phosphate as superphosphate and 60 lbs. of potash as sulphate. The plat given nothing further yielded 144 lbs. of sugar per acre less than the check plat. The best result in this series, a gain of 1,937 lbs. of sugar per acre, followed the application of 60 lbs. of nitrogen as blood meal during January. "The plats which received nitrogen in the form of dried blood have, in each case, given better results than those where the equivalent amount of nitrogen was applied either as sulphate of ammonia or as nitrate of soda." Sulphate of ammonia applied in June gave practically no increase.

On the phosphate series each plat received 60 lbs. of nitrogen as sulphate of ammonia and 60 lbs. of potash as sulphate. The greatest increase, 1,807 lbs. of sugar, followed the application of 80 lbs. of phosphate per acre in basic slag. Superphosphate of lime usually caused a diminished yield and in no case was its increase economically profitable.

Each of the potash plats received 60 lbs. of nitrogen as sulphate of ammonia and 80 lbs. of phosphate as superphosphate. The plat receiving 60 lbs. of potash as sulphate applied partly in January and the remainder in June yielded 635 lbs. more sugar per acre than the no-potash plat.

A summary of the 16 years' tests shows that on the nitrogen series the best monetary result followed the application of 40 lbs. of nitrogen, 15 lbs. in January and 25 lbs. in June. The net gain as compared with the no-manure plat was \$21.16 or \$20.97 as compared with that receiving only phosphates and potash. In the phosphate series 80 lbs. of phosphate as basic slag was applied at a loss of 67 cts., while 100 lbs. on a heavy clay brought a gain of \$1.96. Perhaps because of the lime in the slag in the potash series, an application of 80 lbs. of potash as sulphate gave an increased profit of \$16.31 per acre or \$10.95 more than the plat treated only with nitrogen and phosphates. All things considered, phosphates appear to have reduced the yields and the best results were obtained on plats that received no phosphate whatever, with the possible exception of the clay plat which received basic slag.

Varieties producing little or no fertile pollen were planted chess-board fashion with others. Eighteen rows were bagged and artificially pollinated with negative results. Of the hybrids which have been grown to maturity none shows particular promise. Of 4,086 seedlings planted in 1907, 88 are of sufficient value to be retained. Of 14 seedlings obtained in 1902 from B 208 and D 95, 4 have excelled White Transparent with yields ranging from 5,589 to 6,673 lbs. of sugar per acre.

A list of the selected varieties for 1909 is given in which each variety and its characteristics are described. On black soils in 1909, plants of B 6450 and B 1376 yielded 6,429 and 5,756 lbs. of sugar per acre, respectively, as compared with 3,827 lbs. from White Transparent. On red soils, the plants and rattoons of B 3390 and B 376 averaged 7,474 and 7,235 lbs. of sugar per acre, respectively, as compared with 6,501 from White Transparent. During the period 1905–1909, plants of B 147 and B 1529 yielded 6,551 and 6,451 lbs. of sugar per acre, respectively, as compared with 5,840 from White Transparent. B 6450 and B 1753 proved best in germinative power and freedom from rotten canes. The results with canes grown experimentally on various estates are given in detail in 58 tables.

Turnip manurial and variety experiments, 1909–10, A. MACPHERSON (*Jour. New Zeal. Dept. Agr., 1 (1910), No. 6, pp. 406–421, figs. 4*).—The author reports the results of variety and manurial experiments with turnips.

Parafield seed wheats, A. E. V. RICHARDSON (*Jour. Dept. Agr. So. Aust., 14 (1910), No. 5, pp. 476–486, figs. 17*).—The author announces that the department has seed wheat of certain varieties for distribution, and presents photographs of 2 different aspects of the heads of each of 16 varieties. The cultural value, botanical characteristics, cropping power, and resistance to disease or drought are briefly stated in discussion of the several varieties.

Weed studies, E. VITEK (*Monatsh. Landw., 3 (1910), No. 11, pp. 333–344*).—This article reports the results of pot experiments with sand, field soil, and clay, with rye, summer wheat, barley, oats, charlock, white radish, corn cockle, corn poppy, corn flower, plantain (*Plantago lanceolata*), sorrel, and (*Rumex acetosela*). Tables state the amounts of the more important salts present in the soil and the analyses of the different species after 30 and 60 days' growth.

Studies of the rate of food assimilation in different soils indicated that assimilation during the first 30 days was considerable, but that the weeds excelled the grains in this respect, especially on soils containing a limited supply of plant food.

HORTICULTURE.

A manual of horticultural plant breeding, M. LÖBNER (*Leitfaden für gärtnerische Pflanzenzüchtung. Jena, 1909, pp. VII+160, figs. 10*).—This is essentially a manual of information for the commercial breeding of new ornamentals, fruits, and vegetables.

Part 1 discusses the principles underlying the production of new plants directly from seedling variations and mutations, through long continued selection, crossing, hybridizing, sport variation, and graftage, and from importations. A short descriptive account is also given of the work of the seed breeding station at Svalöf, Sweden. Part 2 deals specifically with the progress which has been made, including methods, in the development of various new flowers, shrubs, fruits, and vegetables, together with suggestions for further improvement by breeding and the naming and introduction of novelties.

A new method of preserving flower pollen in a viable condition, J. SIMON (*Gartenwelt, 15 (1911), No. 7, pp. 94, 95*).—As a result of his investigations on the longevity of pollen of various plants, the author concludes that dryness of the atmosphere is an important factor in preserving the pollen. By the use of water-free calcium chlorid in sealed vessels to absorb the humidity of the inclosed air, pollen grains of the pumpkin were preserved for 5 weeks in a viable condition and fresh pollen of *Rhododendron kohinoor* for 13 weeks.

The author recommends the use of the following method in preserving pollen from various plants: The pollen is collected in a glass vessel from 4 to 5 cm. deep and 0.5 cm. wide and the mouth loosely plugged with wadding. In a vessel from 13 to 14 cm. deep and about 5 to 8 cm. wide water-free calcium chlorid is placed to a depth of about 3 cm. and covered with a layer of wadding about 2 cm. deep. The smaller vessel containing the pollen is then placed inside the larger vessel, which is then sealed. The vessel should be opened for short periods only, since the calcium chlorid will absorb humidity from the exterior air.

[Report of] Massachusetts Asparagus Growers' Association, T. HOLLIS (*Mass. Asparagus Growers' Assoc.* [*Rpt.*], *1910, pp. 3*).—A brief progress report is given of the cultural experiments with asparagus being conducted at Concord, Mass., cooperatively by the Massachusetts Experiment Station, the United States Department of Agriculture, and the Massachusetts Asparagus Growers' Association.

One bed of asparagus set out in the spring of 1909 was cut profitably and without injury in the following season. This phenomenal growth is attributed to thorough preparation of the soil and the use of roots from selected seed of plants having a carefully selected ancestry.

Experiments in the use of vetch and crimson clover as cover crops indicate that farmers in the vicinity of Concord can profitably grow their own seed of these crops. For the favorable development of seed, however, it is advisable to furnish vetch with something to climb on, brush being used with success at the substation.

The work of breeding asparagus resistant to rust which is being conducted by J. B. Norton of this Department has progressed favorably. One variety, the New American, used as a male parent has demonstrated prepotency beyond all others in the experiments. Although rust conditions were serious in 1910, all of the seedlings resulting from crosses between the above male parent and various female parents were in fairly vigorous condition. A number of these crosses showed almost no rust; one entire division from one particular female was thrifty and showed no rust at all. It is hoped that from this latter mating and its progeny a rust-resistant strain will be secured.

French method of intensive cultivation and asparagus forcing, H. HERRMAN ([*Louisville, Ky., 1910*], *pp. 50, figs. 3*).—A brief popular treatise on intensive vegetable culture.

Sterility in fruit trees, E. WALLIS (*Jour. Dept. Agr. Victoria, 9* (*1911*), *No. 1, pp. 10–19, figs. 3*).—A popular discussion of the causes and remedies for sterility. With a view to assisting prospective planters in securing adequate cross-pollination in their orchards, lists are given of the different varieties of apples, pears, plums, peaches, and cherries and their blossoming periods in the various fruit-growing centers of Victoria.

Apple culture in Ohio, F. H. BALLOU (*Ohio Sta. Bul. 217, pp. 527–559, figs. 17*).—This bulletin discusses apple growing in Ohio relative to its past, present, and future, together with the essentials of successful apple culture, including the location of the orchard, elevation, soil, culture, planting, varieties, pruning, renewal of old orchards, spraying, and thinning. The bulletin concludes with an account of successful demonstration work conducted in Washington County in 1909 in the spraying for control of apple scab.

In the spraying experiments standard Bordeaux mixture (4 : 6 : 50) was largely used as the fungicide and arsenate of lead as the insecticide. The work was conducted in 3 orchards which had for several years failed to produce marketable fruit. The results for each orchard are presented in detail. The summarized results, based on many counts from different sprayed and unsprayed trees in the 3 orchards, show for the sprayed trees 70 per cent of sound, perfect apples, 17 per cent very slightly scabbed, and 13 per cent deformed by scab;

for the unsprayed trees 0.8 per cent sound, perfect apples, 35 per cent very slightly scabbed, and 74.2 per cent deformed by scab.

Some suggestions for Rhode Island apple growers, A. E. STENE (*Ann. Rpt. Bd. Agr. R. I., 25 (1909), pp. 93–181, pls. 21, figs. 22*).—This is a popular treatise on apple culture with special reference to Rhode Island conditions. It discusses the financial outlook in orcharding, orchard conditions in Rhode Island, purchase of nursery stock, varieties, soil and site, preparation of new land, planting and cultivation, cover crops, cross-pollination, pruning, thinning, orchard fertilization, insects, plant diseases and spraying, protection against mice and other rodents, renewal of old orchards, dwarf apples, harvesting and marketing, storage, and apple by-products.

New method of grafting fig and olive trees, G. C. ROEDING (*Cal. Cult., 36 (1911), No. 7, pp. 195, 198, figs. 4*).—The method of grafting which is here described and illustrated consists essentially in inserting the scions in notches at the side of the top of the stock instead of in a cleft as in the ordinary cleft grafting. The scion is placed against the stock and the outline of the scion is cut into the stock so that when the bark is removed the scion fits closely into the groove made for it. The author claims to have no difficulty in making fully 90 per cent of the scions grow by this method of grafting, although it can not be employed until the sap begins to flow.

Viticulture and vine improvement, DÜMMLER (*Ber. Grossh. Bad. Landw. Vers. Anst. Augustenberg, 1909, pp. 130–140*).—A report on the viticultural section of the agricultural experiment station of the Grand Duchy of Baden, including tabular data showing the condition of European grapes grafted on various American stocks.

Single character v. tout-ensemble breeding in grapes, T. V. MUNSON (*Amer. Breeders Mag., 1 (1910), No. 4, pp. 274–279*).—In this discussion the author advocates general character breeding, or the production of as many desirable points as possible in the product.

His experience in breeding grapes has shown that it is not safe to assume that the female parent transmits vine characteristics while the male transmits fruit characteristics. The following law has been determined with several pairs of species to the second generation: "Species of grapes very uniform in character when hybridized with species of very variable character give progeny with the characteristics of the uniform species dominant."

Experiments with phylloxera-resistant stocks at Howlong State Viticultural Station, M. BLUNNO (*Agr. Gaz. N. S. Wales, 21 (1910), No. 11, pp. 975–983*).—The results for the 3 years, 1908–1910, are given of experiments conducted to note the grape-bearing capacity of European vines grafted on various phylloxera-resistant stocks. The data show the yield per acre and analysis of the grapes for each season.

The hybrid direct bearers in the valley of the Rhone in 1910, A. DESMOULINS and V. VILLARD (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 32 (1911), Nos. 3, pp. 84–86; 4, pp. 112–118; 5, pp. 132–137; 6, pp. 180–183*).—As in previous years (E. S. R., 22, p. 340) notes and data are given of a large number of hybrid direct bearing grapes. In conclusion the various hybrids are classified relative to their resistance to mildew in 1910, according to the nature of the soil best suited for them, and according to the intensity of coloration of their must.

[Cacao manurial plats in Dominica], H. A. TEMPANY (*Imp. Dept. Agr. West Indies Rpts. Bot. Sta. Dominica, 1909–10, pp. 22–33*).—The results to date are given of the fertilizer and mulching experiments being conducted with cacao at the Dominica Botanic Station, including results of fertilizer experiments conducted in several county districts. The results as a whole confirm those previously noted (E. S. R., 23, p. 343).

The oil palm, P. HUBERT (*Le Palmier a Hulle. Paris, 1911, pp. IX+314, figs. 100*).—A treatise on the oil palm (*Elæis guineensis*) with particular reference to the French Colonies.

Part 1 contains general considerations relative to the palm-oil industry and discusses the botany, varieties, and geographical distribution of the oil palm, together with its habitat, climatic and soil requirements, details of the culture and management of oil-palm plantations, harvesting, returns, diseases and other enemies, and various uses in producing countries. Part 2 treats in detail of the technology of the palm-oil industry both in producing and importing countries, including the properties and uses of palm oil. Part 3 discusses the commercial and economic phases of the industry. Part 4 consists of a memorandum of information relative to the French Colonies with special reference to the oil palm and its industries.

Papers on the oil palm, A. CHEVALIER (*Vég. Utiles Afrique Trop. Franç., 1910, No. 7, pt. 1, pp. 127*).—These papers as a whole consist of the results of the author's investigations of the oil palm (*Elæis guineensis*) in French West Africa.

Chapter 1 contains general considerations relative to the extent and importance of the palm-oil industry, and the succeeding chapters deal with the oil palm relative to its history, geographical distribution, botany, varieties, biology, and culture, the harvesting of the fruits, preparation of the oil and nuts, marketing and exporting, and the future of the oil palm and methods of increasing its production in the French colonies. The principal publications dealing with the oil palm are listed.

Isothermic installations for the transport of fruits, DANIS (*1. Cong. Internat. Froid [Paris], Rap. et Commun. 1908, III, pp. 697–715*).—A paper read before the First International Congress of Refrigeration, Paris, 1908, in which the author discusses the various methods and equipment involved in the cold storage transportation of fruits.

Refrigeration of citrus fruits in transit from California, J. S. LEEDS (*1. Cong. Internat. Froid [Paris], Rap. et Commun. 1908, III, pp. 602–612*).—A paper on this subject presented to the First International Congress of Refrigeration, Paris, 1908, in which the author deals largely with the methods of operation employed by the refrigerator car line service in handling the citrus fruit crop of California.

Sea transport of bananas by refrigeration, H. J. WARD (*1. Cong. Internat. Froid [Paris], Rap. et Commun. 1908, III, pp. 775–780, figs. 2*).—In this paper which was presented before the First International Congress of Refrigeration, Paris, 1908, the refrigerating and ventilating systems used in the English banana trade are described.

Tests made on flowering plants in the cold storage plant at Amsterdam, P. DE VRIES (*1. Cong. Internat. Froid [Paris], Rap. et Commun. 1908, III, pp. 10–13*).—A paper presented to the First International Congress of Refrigeration, Paris, 1908, in which the general results are given of a comparative trial of various flowering shrubs and bulbs to determine the effect of artificial cold storage upon their subsequent growth and flowering.

For the most of the plants stored no particular influence, either favorable or unfavorable, was produced by the cold. Lilacs and lilies of the valley, however, were considerably improved by cold storage, both as to the development of the flowers and in hastening the blossoming period. The cold-storage process appears to be especially applicable in countries such as Holland where the winter dormant period often does not set in until the end of December.

The book of the flower show, C. H. Curtis (*London and New York, 1910, pp. IX+109, pls. 16*).—This is presented as a reference handbook for those having the management of flower shows and the compilation of rules and regulations for the use of horticultural societies. Directions are also given for preparing cut flowers, fruits, and vegetables for exhibition.

Fertilizer tests with variegated forms of Pelargonium and Ligularia, K. Weydahl (*Tidsskr. Norske Landbr., 17 (1910), No. 6, pp. 273–286*).—The author discusses the phenomena of variegation in plants and describes fertilizer tests conducted with variegated varieties of Pelargonium and Ligularia (Senecio) to determine the influence of fertilizers on the formation of variegated leaves.

With the Pelargonium the nitrogenous fertilizers appear to counteract either directly or indirectly the formation of yellow and white variegations. On the other hand, they appear to favor the formation of spots on leaves of the leopard plant (*Senecio kæmpferi*, var. *aureo-maculatus*) to a marked degree. The author concludes that variegation appears to be an inherited character with Pelargonium and to be intimately related to the growth of the plant. On the other hand, nitrogen appears to stimulate indirectly variegation in Ligularia without any particular relation to the growth of the plant.

Gardens near the sea, Alice Lounsberry (*New York, [1910], pp. XV+274, pls. 73*).—A popular treatise dealing with the making and care of, and plant materials for, gardens on or near the coast, with reference also to lawns, grounds, trees, and shrubbery. The text is fully illustrated.

FORESTRY.

The development of British forestry, A. C. Forbes [*London, 1910, pp. XI+274, pls. 32*].—This work presents a general review of the whole problem of afforestation from the standpoint of the landowner and of the practical forester, many lessons being drawn from the continental forestry of Europe. The successive chapters discuss some national aspects of forestry, the forest requirements of the United Kingdom, the relation of agriculture to forestry development, climate and tree growth, soil and surface conditions in the British Isles, the need for improved methods and practice in British forestry, the economic value of the British forest flora, some financial aspects of British forestry, and the state and private ownership of woods.

Forest management (forest working plans), C. A. Schenck (*Asheville, N. C., 1907, pp. 33*).—This consists of a guide to lectures on forest management delivered by the author at the Biltmore Forest School.

Eighth report of the forest commissioner of the State of Maine, E. E. Ring (*Rpt. Forest Comr. Maine, 8 (1910), pp. 110, pls. 3, figs. 2*).—In addition to the report of the forest commissioner, which is largely comprised of a résumé of the forest fires in 1909–10, including methods of fire protection and suggestions for improvement, a report by J. M. Briscoe on the present status of the forestry department at the University of Maine, an article on the care of the farm woodlot, by G. E. Tower, and the results of a special study made by S. T. Dana of the Forest Service of this Department, relative to the importance, distribution, and utilization of the paper birch in Maine (E. S. R., 21, p. 443) are appended.

Communication on the results of the Saxon state forest administration in 1909 (*Tharand. Forstl. Jahrb., 61 (1910), No. 2, pp. 136–140*).—A statistical and financial statement of the work and results of the forest administration in 1909.

Progress report of forest administration in the Andamans for 1909–10, H. A. FARRINGTON (*Rpt. Forest Admin. Andamans, 1909–10, pp. IV+30*).—The usual progress report relative to the constitution, management, and exploitation of the state forests in the Andamans, including a financial statement for the year. The important data are appended in tabular form.

Coombe plantation, Keswick: A successful plantation at a high altitude, R. L. ROBINSON and A. L. WATT (*Jour. Bd. Agr. [London], 17 (1910), Nos. 4, pp. 265–283, pls. 5, figs. 3; 5, pp. 353–370*).—The data, including the revenues, expenditures, and financial returns, are given of a 198-acre plantation principally of spruce and larch started at Keswick, England, in 1848 and on which the work of clean cutting was started in 1903. Consideration is also given to the effect of elevation and exposure on larch and spruce.

Forest fires, A. JACQUOT (*Incendies en Forêt. Paris and Nancy, 1904, 2. ed., pp. 400*).—This work as a whole comprises a handbook of information relative to the appraisement of damage from forest fires. It was prepared with the view of assisting various classes of laymen, as well as foresters, in the appraisement of damage from forest fires, in the settlement of the terms of compulsory acquisition, temporary concessions, and generally in all cases of injury to forest crops. Part 1 deals with the judicial and administrative phases; part 2 discusses the general principles of estimations, rates, and values of a forest at its different ages; part 3 takes up in detail the appraisement of damage in various forest types; and part 4 contains specimen reports and reference tables.

A bibliography of the works consulted is given.

Forest fires, A. JACQUOT, trans. by C. E. C. FISCHER (*Calcutta, 1910, pp. XV+278*).—This is an English translation of the above work made with the view of its application in so far as possible to the question of forest fires in India. A résumé of the Indian laws and rules connected with forest fires is added but the bibliography mentioned above is not included.

The use book: Water power (*U. S. Dept. Agr., Forest Serv., 1911, pp. 86*).—This section of the use book (E. S. R., 22, p. 542) contains regulations and instructions for the occupancy and use of the National Forests for purposes of water power development and utilization. These instructions, which were issued by the Secretary of Agriculture on December 28, 1910, supersede all previous regulations for like purposes.

Studies of trees in winter, ANNIE O. HUNTINGTON (*Boston, 1910, 2. ed., pp. XXIV+198, pls. 79, figs. 3*).—An analytical key to trees in winter, based largely on the contrasting characters of the buds, leaf-scars, and stems, has been added to the present edition of this work (E. S. R., 14, p. 664).

Forest border studies in the Austrian Alps, R. M. GRAZ (*Mitt. Justus Perthes' Geogr. Anst. Ergänzüngsh. 168, 1910, pp. VIII+102, pl. 1, map 1*).—Part 1 of these studies comprises a detailed survey relative to the locations of the climatic timber line in the several parts of the Austrian Alps. Part 2 is largely a theoretical consideration of the relation between the timber line and the climatic factors.

A contribution to the study of some timbers of the Argentina Chaco, D. MARCELO DE BLOCHOUSE (*Min. Agr. [Argentina], Dir. Enseñanza Agr. [Pub.], 4. ser., 1910, No. 12, pp. 24*).—A brief description of 69 forest species occurring in the vicinity of Resistencia, Argentina. The data for each species include the common and botanical name, average growth dimensions, appearance, density, and uses of the wood. The species are further classed relative to their value for tanning purposes, as fruit trees, and as yielding medicines and tinctures. Data are also given on the principal mechanical properties of 24 species.

In the Landes country.—Exploitation of resinous forests, J. H. RICARD (*Au Pays Landais: Exploitation des Forêts Résineuses. Paris, 1911, pp. 252, figs. 20, map 1*).—This is a historical account of the fixation of sand dunes and the development of Maritime pine forests in the departments of Gironde and Landes, including a sketch of the manners and characteristics of the people, a study of the exploitation of the Maritime pine, and a discussion of economic and social conditions of modern life in the Landes.

The principal and intermediate yield of red beech in Saxony, M. KUNZE (*Tharand. Forstl. Jahrb., 61 (1910), No. 2, pp. 97–110*).—The data here presented consist of measurements which have been made of 38 experimental areas since 1890, and include information relative to the location and age of each stand, the number of trees, and the basal area and volume of wood per hectare, both in the dominant and secondary forests. A table shows the distribution of various sizes of wood in the different experimental areas.

Forms and variations of the common pine (Pinus silvestris), M. KIENITZ (*Ztschr. Forst. u. Jagdw., 43 (1911), No. 1, pp. 4–35, pls. 2*).—A study of the variability of the common pine as occurring in different European countries, in which a large number of characteristic variations are illustrated by drawings reproduced from photographs. The study has a special bearing on the question of procuring seeds from countries where the climatic conditions are similar to those existing where the stand is to be established.

In the experience of the author unsuitable forms may be detected during the first year of the seedlings. These should be discarded since variations manifested in youth appear to be maintained or even to be intensified throughout the life of the tree.

The silviculture of Hardwickia binata (anjan), D. O. WITT (*Indian Forest Rec., 2 (1910), No. 3, pp. 75–135, pls. 17, map 1*).—A detailed study of this species relative to its botany, utility, distribution, locality, shape, and development, including the formation, care, and regeneration of anjan forests, with special reference to the anjan forests in the Nimar district of the Central Provinces, India.

Germination and growth of sandal seedlings, RAMA RAO (*Indian Forest Rec., 2 (1910), No. 3, pp. 137–157, pls. 10*).—A brief record is given of experiments in germinating and propagating sandal seedlings in the Kurnool district, Madras, India. From the knowledge derived from these experiments it appears that in-situ sowing is both better and cheaper than planting out nursery-raised seedlings. A number of plates are given illustrating the development of sandal seedlings.

On West African plantation rubber, F. FRANK and E. MARCKWALD (*Pflanzer, 6 (1910), No. 17–18, pp. 257–270*).—Analyses are reported of a number of samples of West African rubber, largely *Manihot glaziovii*, which were coagulated by various methods. The data show the method of coagulating the rubber, the loss in washing, the resin and ash content, and the qualitative composition of the ash. Analyses of the vulcanized product are also given for 14 of the samples.

Asphaltic oils in the preservation of railway ties, F. W. CHERRINGTON (*Municipal Engin., 40 (1911), No. 2, pp. 95–103, figs. 4*).—In this paper, which was read before the Wood Preservers' Association at Chicago, the author presents considerable data based upon observations and various experiments relative to progress made in the use of asphaltic base oil as a wood preservative.

DISEASES OF PLANTS.

Notes on New York plant diseases, I, F. C. STEWART (*New York State Sta. Bul. 328, pp. 305–404, pls. 18*).—This bulletin contains brief notes on various plant diseases and malformations observed in New York during the past 10 years, special attention being given to the occurrence, distribution, and importance of the diseases of economic plants. A bibliography of 165 titles is appended.

A handbook of the fungus diseases of West Indian plants, K. BANCROFT (*London, 1910, pp. 70, pls. 6*).—This is a compilation of the common diseases of economic plants of the West Indies, including discussions of the pathological effects caused by these fungi, brief taxonomic descriptions of them, and remedies for their control.

The control of plant diseases, H. H. WHETZEL (*New York Cornell Sta. Bul. 283, pp. 480–498, figs. 17*).—The symptoms of the principal diseases of orchard, truck, and field crops are given, together with directions for their control.

On plant diseases, especially of agricultural crops, M. L. MORTENSEN (*Plantesygdomme og disses Bekæmpelse særlig hos Landbrugsplanterne. Slagelse, 1910, pp. 31*).—This is a popular discussion of the plant diseases commonly met with in agricultural crops in Denmark, together with methods for their control.

Observations on diseases of agricultural crops, F. K. RAVN (*Tidsskr. Landbr. Planteavl, 16 (1909), No. 5, pp. 738–758*).—In a lecture before the Royal Agricultural Society of Denmark a general résumé is given of the annual reports published on the subject of plant diseases in Denmark by E. Rostrup from 1884 to 1905 and by the author from 1906 to 1908.

New species of Uredineæ, VII, J. C. ARTHUR (*Bul. Torrey Bot. Club, 37 (1910), No. 12, pp. 569–580, fig. 1*).—The author describes 15 new species and combinations of rusts, among which may be noted *Puccinia deschampsiæ* on *Deschampsia cæspitosa* from Colorado, *Uromyces glyceriæ* on *Glyceria septentrionalis* and *G. acutiflora*, and *Peridermium fructigenum* on *Tsuga canadensis* from Connecticut.

Cultures as a means for a better differentiation of the systematic position of certain Hyphomycetes, O. APPEL and H. W. WOLLENWEBER (*Ber. Deut. Bot. Gesell., 28 (1910), No. 8, pp. 435–448, pl. 1, figs. 2*).—As a result of cultures on various media, such as potato stems and tubers, peas, beans, etc. of certain species of the Hyphomycetes, especially of the genus Fusarium, the authors claim that the various stages in the life cycle of the fungus under culture can often be discovered. Especially may the perfect stage of many of the imperfect fungi and variations in the spores be thus determined.

On the biology of Sclerospora, a parasite of the Gramineæ, V. PEGLION (*Centbl. Bakt. [etc.], 2. Abt., 28 (1910), No. 22–24, pp. 580–589, figs. 6*).—The author discusses the effects of various species of this genus on their respective hosts, special attention being given to malformation of the spikes of *Setaria viridis*, and the production of witches' brooms on *Glyceria festucæformis*, *Crypsis aculeata*, *C. alopecuroides*, and *C. schönoides* by *Sclerospora macrospora*.

The susceptibility of certain cereals to smut, L. S. KLINCK (*Ann. Rpt. Quebec Soc. Protec. Plants [etc.], 2 (1909–10), pp. 14, 15*).—As a result of two years' experiments on smut infection it is claimed that the following factors play an important part in determining the amount of smut, viz: Season, class of grain, variety, strain, date of seeding, size of seed, rate of seeding, date of cutting, and manner of planting.

Investigations on the behavior of smut spores in the bodies of animals and in stable manure, F. HONCAMP, H. ZIMMERMANN, and G. SCHNEIDER (*Centbl. Bakt. [etc.], 2. Abt., 28 (1910), No. 22–24, pp. 590–607*).—Tests were made on the viability of bunt spores (*Tilletia lævis* and *T. caries*) after passage through the digestive tract of swine, cattle, horses, sheep, rabbits, chickens, and pigeons, and also on the possibility of infection in the field by the use of stable manures contaminated with smut spores.

It was found that the bunt spores after passage through the digestive tract had for the most part lost their power to germinate, except in the case of the swine. The death of the spores was apparently caused by the acids of the digestive fluids. The high degree of fluidity present in the digestive tract also hindered the germination of the spores. The excreta as such, indeed, injured the viability, but in none of the experiments was the ability of the spores to germinate completely destroyed.

The investigations showed that in practice there was no danger of bunt infection from the use of manure from animals which had eaten smutty food. It is also claimed that bunt spore balls lying on the ground in the fields can resist cold, drying, and dampness for two years without losing the power of germination, but that when these spore masses are broken up during the reseeding of the fields to grain their ability to produce infection would depend upon the dampness of the soil.

The enemies of oats, D. Brocq-Rousseu and E. Gain (*Les Ennemis de L'Avoine. Paris, 1910, pp. XIV+184, pls. 24*).—The authors discuss the fungus and insect enemies of various species of the genus Avena, especially those of economic value. The subject matter is treated under two heads, viz, enemies which attack the plants during the growing period and those which infest the grain after it is harvested.

Figures, brief descriptions, and synonymy citations for each species are given. A bibliography is appended.

"Take-all" (Ophiobolus graminis), A. E. V. Richardson (*Jour. Dept. Agr. So. Aust., 14 (1910), No. 5, pp. 466–471*).—Attention is called to a serious outbreak of this diesase in certain sections of South Australia, in which the wheat on areas of from 1 to 50 acres suddenly contracted the disease to such an extent that not even one bushel per acre was harvested. Most of the wheat plants died outright, while other cereals were free from the disease, especially oats.

The disease appears at all stages of growth. If the attack occurs just before the stalk is formed, the leaves gradually turn yellow and the plants shrivel up and die. At other times it attacks the wheat after it is in head, when the head suddenly whitens as if blighted, and the entire plant dies.

The disease attacks wheat, spear grass, and barley grass, usually occurring in circular patches, and in all cases the affected plants show a black incrustation on the basal portions of the stem. It occurs on all types of soils, and on new as well as on old land.

Burning the stubble has resulted in crops free from take-all, but it is stated that the best method of control is to starve it out by alternate fallowing and cropping with oats, in a 5-year system of rotation, with wheat as the first and fifth years' crop.

The late blight of celery, S. S. Rogers (*California Sta. Bul. 208, pp. 83–115, pl. 1, figs. 18*).—This paper covers the work done on this disease (*Septoria petroselini apii*) by the station during the past 4 years, including the observations and results of experiments conducted in the celery fields of Orange County during the season of 1909 and the spring of 1910.

After a brief description of the methods used in growing celery, the author gives the history, distribution, and appearance of the fungus, together with the methods used for its control. As a result of investigations it is recommended that a 5:6:50 Bordeaux mixture be used at the rate of 30 to 40 gal. per acre when the plants are small, the amount to be increased as the plants grow until not less than 100 gal. per acre is used on plants 15 or more inches tall. The seedlings should be sprayed at least twice, and again not later than 6 weeks after transplanting into the field, or earlier if blight is noticed. Spraying should then be done once a month until the seasonal rains or heavy fogs come;

thereafter, every 2 weeks until the crop is harvested. Where the plants are over 15 in. tall, they should be gone over twice at each spraying, the machine moving in an opposite direction the second time. Demonstration plats sprayed according to these directions were almost entirely free from blight, while all checks which were not sprayed at all were practically ruined.

Brief notes are also appended on other fungus diseases and insect pests of celery.

A bacterial disease of the Irish potato, G. H. PETHYBRIDGE and P. A. MURPHY (*Nature [London], 85 (1910), No. 2148, p. 296*).—In a paper read before the December meeting of the Royal Irish Academy at Dublin, the authors describe a bacterial disease of the potato plant of frequent occurrence in Ireland, and give an account of the organism (for which the name *Bacillus melanogenus* is proposed) isolated from the diseased plants, and its successful inoculation on healthy plants and tubers.

The bacillus produces a decay of the living tissues of a variety of plants in addition to the potato, and resembles in many respects other organisms causing similar diseases in the Old and New Worlds.

Some observations on the leaf-roll disease of the potato, T. HEDLUND (*Tidskr. Landtmän, 31 (1910), pp. 512–515, 532–541; abs. in Bot. Centbl., 114 (1910), No. 22, pp. 567, 568*).—The author claims, from his observations and study of the disease as it exists in southern Switzerland, that it can originate without infection from leaf-roll diseased plants, and is caused primarily by a checking of the respiration in the underground parts due to low temperature and rainy weather in combination with a packed condition of the soil and the too great depth at which the seed tubers have been planted. The diseased condition thus produced persists throughout the entire vegetative period of the plants, resulting in a serious checking of tuber growth.

It is also claimed that the disease can result from the use of seed tubers from leaf-roll diseased plants, even when the weather conditions and other external factors in the earlier stages of growth are entirely favorable. The author believes that the leaf-roll disease is probably not infectious, but is only a pathological adaptive mutation.

For controlling the disease, a loose seed bed, sound seed tubers, not too deep planting of the seed, and liming the soil are recommended.

A biochemical study of the leaf-roll disease of the potato.—I, The oxidases of the tubers, G. DOBY (*Kisérlet. Közlem., 13 (1910), No. 5, pp. 595–615, dgm. 1; Ztschr. Pflanzenkrank., 21 (1911), No. 1–2, pp. 10–17, dgm. 1*).—A study was made of the oxidases present in healthy plants and those attacked by the leaf-roll disease, in which oxygenase, peroxidase, and tyrosinase were found, but the quantities of each ferment present were not sufficient to distinguish between healthy and diseased tubers at the time of planting.

A brief bibliography is appended.

Contribution to the study of the leaf-roll disease of the potato, G. KÖCK and K. KORNAUTH (*Monatsh. Landw., 3 (1910), No. 12, pp. 365–369*).—This is a discussion of several recent articles on the leaf-roll disease of the potato, especially with reference to its cause.

The claims made by Bohutinsky-Krizevci (E. S. R., 23, p. 743) and Vanha (E. S. R., 24, p. 154) as to the parasitic nature of this disease are held to be unsupported by other investigators.

Potato spraying experiments, 1910, D. TURNER (*Agr. Students' Gaz., n. ser., 15 (1910), No. 2, pp. 38–42*).—The results of spraying experiments conducted in the south of England with 14:9:100 Bordeaux mixtures for the control of the late blight of the potato (*Phytophthora infestans*), are reported.

It was found that for the season of 1910 late spraying was more profitable than early, that one late spraying was better than an early and a late spraying, and that Scotch seed potatoes gave better results as regards yield and disease resistance than Irish seed of the same variety.

Tests of summer sprays on apples and peaches in 1910, G. P. CLINTON and W. E. BRITTON (*Connecticut State Sta. Rpt. 1909–10, pt. 7, pp. 583–618, pls. 8*).—The results are given of experiments conducted during 1910 with various lime-sulphur mixtures as regards their fungicidal value and spray injury on apples and peaches.

The following sprays were used: (1) Bordeaux mixtures 4:4:50, 3:4:50, 2:4:50, and 1:4:50, as checks in addition to the unsprayed plats; (2) commercial lime-sulphur mixtures, 1:12 and 1:8 for winter treatment, and 1:50, 1.25:50, and 1.5:50 for summer use; (3) the trade compounds of lime and sulphur, Sulfocide, Bogart's Sulphur Compound, and One for All; (4) self-boiled lime-sulphur mixture, 8:8:50. To all of the sprays except Sulfocide, 3 lbs. of arsenate of lead to 50 gal. of the mixture was added.

From two to four summer treatments for the fungus and insect enemies of the apple were found necessary. The commercial (1.5:50) and self-boiled lime-sulphur sprays produced no appreciable injury to the apple foliage, but a slight russeting of the fruit was noticeable in some cases, while the trade compounds of sulphur, especially when combined with an insecticide, often produced serious leaf burn and fruit fall. In all orchards the sprayed trees gave a lower percentage of fungus infection than the check trees, although the difference was not great, due to the unfavorable season for the general development of fungus diseases. The treatments reduced the insect injury of the apple, especially that due to the codling moth, more than one-half.

In the spraying experiments with peaches, the brown rot, leaf curl, scab, curculio, peach sawfly, and San José scale were especially under observation. Varieties very susceptible to the brown rot were selected for the tests, and about 125 trees were sprayed from 1 to 4 times. Self-boiled lime sulphur, 8:8:50; Sulfocide, 1:400; Niagara lime sulphur, 1:75 and 1:100; and potassium sulphid, 1:50, were the sprays used. Three summer treatments were given in all of the orchards, and in the first and second applications arsenate of lead at the rate of 3 lbs. to 50 gal. was used. The self-boiled lime-sulphur caused no foliage injury. The 1:75 Niagara lime-sulphur produced a slight injury, while the other sulphur mixtures tested were not injurious when used alone, but when combined with arsenicals often caused serious foliage damage. Both self-boiled and Niagara lime-sulphur mixtures gave good results in checking fungus diseases. Peaches sprayed for leaf curl on April 1 with a 1:9 commercial lime-sulphur mixture showed only a trace of the disease, while trees sprayed for brown rot with the self-boiled and Niagara lime-sulphur mixtures 3 times during the summer had over 50 per cent less rot than the unsprayed trees. Not only was the rot prevented, but the sprayed fruits kept better after picking.

On the whole, the authors recommend for general use the self-boiled lime-sulphur mixture for a summer fungicide, although a commercial lime-sulphur mixture like the Niagara at 1:100 solution may prove valuable on the peach.

Report on a disease in the Taurian limes at Antony, W. R. FISHER (*Quart. Jour. Forestry, 4 (1910), No. 4, pp. 293–296*).—Attention is called to a slime flux disease of these exotic limes (*Tilia dasystyla*) which has up to the present time attacked five of the trees and killed two of them. The exact cause of the disease is not known, but it is supposed to be due either to infection in the nursery, to local infection, unsuitable soil at Antony, injury by frosts, or to the unsuitability of the local climate.

Studies on gummosis, J. Grüss and P. Sorauer (*Notizbl. K. Bot. Gart. u. Mus. Berlin, 5 (1910), No. 47, pp. 188–197*).—In a review and discussion of gummosis of fruit trees, especially of the Amygdalaceæ, the authors claim that this trouble results from a normal metabolic assimilation process in consequence of wounds, nutrition disturbances, bacteria, etc., which cause irregularities in the assimilation and nutrition processes.

The diseases of the banana in Central America and Surinam, O. Labroy (*Jour. Agr. Trop., 10 (1910), No. 113, pp. 328–332*).—The author discusses the so-called Panama disease of the banana which is threatening the total destruction in a few years of the entire banana plantations of Central America. The opinions of various investigators as to the cause of this disease are given, followed by a description of the symptoms of the disease and suggestions as to its control. The planting of a variety of Congo banana which is highly resistant to the disease is now in progress in Surinam.

It is also claimed that a species of bee injures the epidermis of the young bananas at flowering time, causing the fruit to become worthless for selling purposes.

Studies on the biology of Gymnosporangium juniperinum, E. Fischer (*Ztschr. Bot., 2 (1910), No. 12, pp. 753–764*).—The results are given of successful cultures of a Gymnosporangium from *Juniperus communis* on *Sorbus terminalis* and *S. latifolia*, for which the name of *G. terminali-juniperinum* n. sp. is proposed.

G. juniperinum from *J. communis* infected *S. aucuparia*, *S. americana*, and *S. hybrida*. As cultures of *G. amelanchieris* on *Aronia nigra*, the usual host for *G. davisii*, were unsuccessful, the author claims that the two rusts are not identical.

The fungus root tubercles of Ceanothus americanus, Elæagnus argentea, and Myrica cerifera, E. G. Arzberger (*Mo. Bot. Gard. Ann. Rpt., 21 (1910), pp. 60–102, pls. 9*).—After a brief historical review and summary of the work done by previous investigators on this subject, the author reports a study of the external characters, internal structures, and the relationship of the fungus to the host, of the tubercles on the roots of Ceanothus, Elæagnus, and Myrica.

For the tubercles on Ceanothus it was found that the infection of the roots was common and occurred through a root hair or an epidermal cell. Three distinct stages in the life cycle of the fungus were noted, viz, (1) the mycelial stage in the host cell, (2) the sporangia stage which initiates the conditions for the digestive cell, and (3) the last stage where all but the walls of the mycelium are absorbed. The nucleus of the invaded host cell at first increases in volume and in the size of the nucleoli and the amount of chromatin present, but later, following the vesicular stage, the cytoplasm and nucleus of the host cell are absorbed. The cell contents of the fungus then disappear and both the host cell and the fungus die. In the earlier stages of the tubercles symbiosis is quite apparent, while later the fungus is able to dissolve the cell walls of the host.

In Elæagnus the fungus mycelium is much narrower than that of Ceanothus, branches profusely and forms vesicles, the contents of which break up into several segments. The fungus is not entirely absorbed by the digestive cell, nor are the cell walls of the host broken down by the fungus. Both the host cells and the fungus finally die.

The tubercles and fungus of Myrica differ in many respects from those of Ceanothus and Elæagnus. No hypertrophy or symbiotic relationship exists as in the other two, and the fungus must be regarded as a parasite.

The form, structure, and behavior of the fungus indicate that it belongs to the genus Actinomyces.

An extended bibliography is appended.

Botrytis as a parasite upon chrysanthemums and poinsettias, P. SPAULDING (*Mo. Bot. Gard. Ann. Rpt., 21 (1910), pp. 185–188, pl. 1*).—Attention is called to the attacks of this fungus (*B. vulgaris*) on flowers of chrysanthemums, on the lower leaves of poinsettias (*Euphorbia pulcherrima*), and of *Primula obconica grandiflora* in the greenhouses of the Missouri Botanical Gardens at St. Louis.

On chrysanthemums the disease first appeared as tiny, watery, discolored spots on the petals, looking as if they had been pricked with a needle. The diseased areas spread rapidly in size until about one-fourth of the petal was affected, after which the diseased tissues wilted and dried up. Later the characteristic fruiting bodies of *B. vulgaris* appeared on the wilted petals.

On the poinsettias the fungus first attacked the slightly projecting angles of the lower leaves of the plants, causing a small, deadened area at the very tips of the angles, while on the lower surface, extending along the larger veins, tiny white drops of the hardened latex could be seen. These small, hardened drops of juice seemed to be very characteristic of this disease upon the poinsettias. As the disease progressed, the affected areas became larger and the extreme tips of the affected angles withered and became discolored. When about one-fourth of the leaf surface was involved the leaf was prematurely shed, leaving, for badly diseased plants, a bare stem with a broad whorl of red leaves at the top. About two days after the leaves were first attacked, Botrytis spores were found in thick groups on the surface of the affected areas.

Limewater Bordeaux for spraying, D. McALPINE (*Jour. Dept. Agr. Victoria, 8 (1910), No. 2, pp. 728–732, figs. 2*).—A Bordeaux spray consisting of 10 oz. of copper sulphate, 8½ gal. of limewater, and water to make up the 50 gal., is recommended in place of the usual Bordeaux mixture.

It is claimed that this limewater Bordeaux mixture is cheaper and quicker acting than the ordinary Bordeaux. Experiments conducted in 1908 on apple black spot (*Fusicladium dendriticum*) showed that it was also as efficacious in preventing that disease.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

African game trails, T. ROOSEVELT (*New York, 1910, pp. XV+529, pls. 50, map 1*).—In this work the author presents an account of the scientific expedition to British East Africa which was sent out by the Smithsonian Institution in 1909 for the collection of large and small mammals. The main part of the work consists of 15 chapters; several appendixes include a list of the large and small mammals collected during the trip, notes by E. Heller, J. A. Loring, and the author on the occurrence, habits, etc., of many species, a brief report of a biological survey of Mt. Kenia, and a discussion of protective coloration in animals, etc.

State of New York forest, fish, and game law, 1910 (*Albany, 1910, pp. 234*).—An act relating to the protection of the forests, fish, and game of the State, enacted in 1909 and amended in 1910, and other data are brought together in this handy pocket form.

The mammals of West Virginia, F. E. BROOKS (*Rpt. W. Va. Bd. Agr., 1910, No. 20, pp. 9–30*).—This list of the known living and recently extinct mammals of West Virginia includes brief notes on each form.

The A. O. U. check-list of North American birds (*New York, 1910, 3. ed., rev., pp. 430, maps 2*).—In this edition the ranges of species and geographical races have been carefully revised and greatly extended, the names conforming to the latest rulings of the American Ornithological Union. The numbering of the species is the same as in the second edition. A total of 1,200 forms, including 804 species and 396 subspecies, are listed.

A. O. U. abridged check-list of North American birds, 1910 (*New York, 1910, pp. 77*).—A pocket check-list of numbered scientific and popular names, as abridged from the above.

Birds of South Carolina, A. T. WAYNE (*Charleston, S. C., 1910, pp. XXI+254, map 1; rev. in Science, n. ser., 32 (1910), No. 828, pp. 668, 669*).—This work is based primarily on the personal observations of the author continued during a period of nearly 30 years, mainly in the coast region of the State, to which it was his intention originally to limit its scope.

The introduction by the editor, P. M. Rea, treats of the physical divisions of South Carolina and the history of South Carolina ornithology. The main body of the work consists of a systematic list of the 309 species of birds of the coast region, followed by an annotated list of 28 additional species from the interior of the State and a hypothetical list of 22 species. A bibliography of about 200 titles and an index complete the volume.

An annotated list of the birds of Costa Rica including Cocos Island, M. A. CARRIKER, Jr. (*Ann. Carnegie Mus., 6 (1910), No. 2-4, pp. 314-915, map 1; rev. in Auk, 28 (1911), No. 1, pp. 122-125*).—In this work a total of 753 species and subspecies is recorded, with full citations of Costa Rican references and many hitherto unpublished records. The 60 pages of introductory matter treat, among other subjects, of the geography and physiography, the life zones, and the history of the ornithology of Costa Rica.

A bibliography, a comprehensive descriptive list of localities at which birds have been collected, and a folding map of Costa Rica are included.

Catalogue of a collection of birds from Costa Rica, J. F. FERRY (*Pubs. Field Mus. Nat. Hist. [Chicago], Ornithol. Ser., 1 (1910), No. 6, pp. 257-282; rev. in Auk, 28 (1911), No. 1, pp. 125, 126*).—This is an annotated list of 74 species collected by the author in Costa Rica from January to March, 1908.

Annual report of the state ornithologist for the year 1909 (*Agr. of Mass., 57 (1909), pp. 245-269, pls. 2, figs. 2*).—The recovery of species of birds decimated by the elements in 1903 and 1904 is discussed and abstracts of reports regarding the breeding of martins in Massachusetts in 1909 are presented.

The results of investigations of the possible poisoning of birds by spraying trees with arsenical insecticides, conducted during the year, were inconclusive. It seems probable that the fatal effects of such spraying have been exaggerated. "We can not say that no birds die from eating live, poisoned insects, from eating poisoned foliage, or from drinking poisoned water, but after several years' study of the subject it seems safe to assume that although probably some birds are fatally poisoned, they are the exception and not the rule."

An introduction to vertebrate embryology, A. M. REESE (*New York and London, 1909, 2. ed., rev. and enl., pp. XXI+340, pl. 1, figs. 118*).—The embryology of the frog, chick, and mammal is taken up in this work.

Plague in England (*Jour. Amer. Med. Assoc., 55 (1910), Nos. 21, p. 1820; 22, p. 1903*).—It has been found that plague prevails extensively among rats in part of Suffolk, one of the eastern counties of England, and that a few cases have occurred in man. Hares and rabbits have also been attacked. The outbreak seems to be due to the landing of an infected rat or rats from one of the many grain vessels which enter the river Orwell from plague-infected countries. Two ferrets are said to have died from plague after eating a dead rabbit.

The flaggellate order Binucleata, M. HARTMANN and V. JOLLOS (*Arch. Protistenk., 19 (1910), No. 1, pp. 81–106, figs. 12; abs. in Bul. Inst. Pasteur, 8 (1910), No. 13, pp. 574–576*).—This article deals with the phylogeny and classification of protozoa occurring in the blood. The author recognizes 7 families as belonging to the order, namely, Trypanoplasmidæ, including the genera Prowazekia and Trypanoplasma; Trypanosomidæ, including the genera Leptomonas, Herpetomonas, Trypanosoma, Schizotrypanum, and Endotrypanum; Halteridiidæ, including the genus Hæmoproteus; Leucocytozoidæ, including the genus Leucocytozoon; Hæmogregarinidæ, including the genera Hæmogregarina, Caryolysus, and Lankesterella; Piroplasmidæ, including the genera Leishmania, Toxoplasma, and Babesia (Piroplasma); and Plasmodiidæ, including the genera Achromaticus, Polychromophilus, Proteosoma, and Plasmodium.

Publications of the Bureau of Biological Survey (*U. S. Dept. Agr., Div. Pubs. Circ. 8, pp. 3*).—This is a list of the publications of the Bureau of Biological Survey of this Department that are available for distribution.

[Report of scientific work in the field of entomology during 1906], E. STRAND ET AL. (*Arch. Naturgesch., 73 (1907), II, No. 2, 3. half, pp. VI+236*).—This part of the work previously noted (E. S. R., 24, p. 161) catalogues the Diptera, Aphaniptera, Trichoptera, Neuroptera, Mallophaga, Thysanoptera, Corrodentia, Orthoptera, Odonata, etc., also the Myriopoda, Arachnida, Prototracheata, and Crustacea.

Insects of the year 1910 in Iowa, R. L. WEBSTER (*Jour. Econ. Ent., 3 (1910), No. 6, pp. 502–504*).—Among the more important insects mentioned are *Phytonomus punctatus*, which was found for the first time in Iowa, *Pegomya fusciceps*, *Sphenophorus parvulus*, *Aphis setariæ*, *Chaitophorus negundinis*, *Meliana albilinea*, and *Peronea minuta*.

Second annual report of the state entomologist of Indiana, B. W. DOUGLASS (*Ann. Rpt. State Ent. Ind., 2 (1908–9), pp. 248, pl. 1, figs. 167*).—In this report brief illustrated accounts are given of some of the more important insect pests, plant diseases, etc., occurring in Indiana. A report on bee inspection in 1909, by G. S. Demuth (pp. 188–229) and the horticultural laws of Indiana are appended.

[Circulars on insect pests in Nebraska], H. S. SMITH ET AL. (*Insect Pest and Plant Disease Bur. Nebr. 1908, Circs. 1, pp. 4, figs. 2; 2, pp. 3, fig. 1; 3, pp. 4, figs. 2; 4, pp. 4, figs. 2; 5, pp. 4, figs. 2; 6, pp. 4, figs. 2; 7, pp. 4, fig. 1; 8, pp. 4, figs. 3; 9, pp. 4, figs. 3; 10, pp. 4, fig. 1; 11, pp. 4, fig. 1; 1909, Circ. 12, pp. 6, figs. 3*).—These circulars are devoted respectively to the box elder aphis (*Chaitophorus negundinis*), the clover-hay worm, the rose-chafer, the cotton or melon aphis, the fall webworm, the white-marked tussock moth, the strawberry leaf-roller, the potato stalk borer, the corn-ear or boll worm, the house fly and allies, a plea for the protection of our birds (E. S. R., 21, p. 246), and the gipsy and brown-tail moths.

The control of insect pests, M. V. SLINGERLAND, G. W. HERRICK, and C. R. CROSBY (*New York Cornell Sta. Bul. 283, pp. 465–479, figs. 15*).—A popular account intended for ready reference, part 1 dealing with insects and their control and part 2 with insecticides.

Fortieth annual report of the Entomological Society of Ontario (*Ann. Rpt. Ent. Soc. Ontario, 40 (1909), pp. 144, pls. 7, figs. 39*).—Among the numerous papers here presented are the following: Reports on Insects of the Year, by A. Gibson, J. B. Williams, and C. B. Nash (pp. 9–16); Observations on a few Insects of the Season, by L. Caesar (pp. 16–18); Nests of the Brown-tail Moth in Importations of French Nursery Stock, 1909, by A. Gibson (pp. 19, 20); Nursery Work in Ontario, by R. C. Treherne (pp. 21–23); Some Guests at the Banquet of Blossoms, by F. J. A. Morris (pp. 23–30); House Flies and Their

Allies, by C. G. Hewitt (pp. 30–36); The Origin and Diffusion of Entomological Errors, by H. H. Lyman (pp. 46–51); Conflicts between Ants, by G. E. Sanders (pp. 51–54); The Spruce Budworm (*Tortrix fumiferana*), by A. Gibson (pp. 54–56); The Snow-white Linden Moth (*Ennomos subsignarius*), by A. F. Winn (pp. 56, 57); Notes on Fruit Tree Scolytids, by J. M. Swaine (pp. 58–63); Observations on Ontario Insects in 1909, by C. J. S. Bethune (pp. 63–67); Injurious Insects of Quebec, 1909, by W. Lochhead (pp. 67–73); *Anisota virginiensis* (pp. 73–75), and Adaptations in the Structure of Insects (pp. 76–82), by T. W. Fyles; The Acarina, with a Host Index to the Species Found in Ontario, by T. D. Jarvis (pp. 82–109); and The Entomological Record, 1909, by A. Gibson (pp. 110–128).

Injurious insects of Ste. Anne's, season of 1909, J. M. Swaine (*Ann. Rpt. Quebec Soc. Protec. Plants* [*etc.*], *2* (*1909–10*), *pp. 46–66, figs. 18*).—Notes are given on the occurrence of the more important insect pests of the year.

Insects which damage saltbush, W. W. Froggatt (*Agr Gaz. N. S. Wales, 21* (*1910*), *No. 6, pp. 465–470, pl. 1, figs. 5*).—The larvæ of several species of moths, 2 weevils (*Elæagna squamebunda* and *Belus ursus* n. sp.), and the saltbush scale (*Pulvinaria maskelli*) are reported to be pests of this valuable fodder plant.

Some forest insects in the season of 1909, T. W. Fyles (*Ann. Rpt. Quebec Soc. Protec. Plants* [*etc.*], *2* (*1909–10*), *pp. 67–69*).—The occurrence of *Anisota virginiensis*, *Datana angusii*, *Symmerista albifrons*, and *Schizura concinna* is noted.

Observations on Termes gestroi as affecting the Para rubber tree, and methods to be employed against its ravages, H. C. Pratt (*Dept. Agr. Fed. Malay States Bul. 3, 1909, pp. 29, figs. 6*).—A report of further studies of this pest (E. S. R., 20, p. 764).

Fourth annual report of the committee of control of the South African Central Locust Bureau (*Ann. Rpt. Com. Control So. African Cent. Locust Bur., 4* (*1910*), *pp. 59, pls. 2, maps 15*).—The work carried on during the locust season of 1909–10 is discussed and the reports received from members of the committee of control on the locust conditions in their respective areas during this period, together with reports from neighboring territories, are presented in full. The minutes and proceedings of the fourth annual meeting of the committee of control, and maps showing the occurrence of the brown locust (*Locusta pardalina*= *Pachytylus sulcicollis*) and the red-winged locust (*Cyrtocanthacris septemfasciata*) from 1906 to 1910, are appended to the report.

A synopsis of the Orthoptera of western Europe, N. Burr (*London, 1910, pp. 160; rev. in Nature* [*London*], *84* (*1910*), *No. 2124, p. 39*).—Short descriptions of genera and species, tables of species under the genera, and the more important naturalized species have been included in the work.

The orchid thrips: Anaphothrips orchidaceus, R. S. Bagnall (*Ent. Rec. and Jour. Variation, 22* (*1910*), *No. 12, p. 287*).—The author finds that when infested orchids blossom the adults and larvæ leave the leaves and may be found sheltered in numbers under the corollas, where by attacking the petals they soon render the flowers unsightly and unmarketable. Because of its secluded habits, ordinary fumigation is not effective in combating it. Periodically cleaning the plants by picking up the adults and larvæ with a camel's hair brush and killing them by immersion in alcohol or other destructive agent is thought to be the only safe method of dealing with it.

The mosquito blight of tea, C. B. Antram (*Indian Tea Assoc.* [*Pamphlet*] *1, 1910, pp. V+19, pls. 2*).—This is a report of studies made of the life history of the so-called tea mosquito (*Helopeltis theivora*) and the results of a number of remedial experiments conducted during the year 1908–9.

Mosquito blight, C. B. ANTRAM (*Indian Tea Assoc. [Pamphlet] 2, 1909, pp. 6*).—A brief report of the results obtained from the application of remedial measures for *Helopeltis theivora* in 1908.

Aphididæ of southern California, IV, E. O. ESSIG (*Pomona Jour. Ent., 2 (1910), No. 2, pp. 223, 224, fig. 1*).—Two species are noted in this fourth paper (E. S. R., 23, p. 257).

Spraying for the citrus mealy bug, E. O. ESSIG (*Pomona Jour. Ent., 2 (1910), No. 3, pp. 246–259*).—Preliminary experiments carried on during the months of January, February, and March are reported.

The natural enemies of the citrus mealy bug, II, E. O. ESSIG (*Pomona Jour. Ent., 2 (1910), No. 3, pp. 260–274, figs. 3*).—In this second paper (E. S. R., 23, p. 559) the author considers the family characters of larvæ and nymphs of Coccinellidæ. The immature stages of *Cryptolæmus montrouzieri* and *Rhizobius ventralis* are described and their life history and habits discussed.

The wild cochineal insect with reference to its injurious action on prickly pear (Opuntia spp.) in India, etc., and to its availability for the subjugation of this plant in Queensland and elsewhere, H. TRYON (*Queensland Agr. Jour., 25 (1910), No. 4, pp. 188–197*).—A critical discussion of the subject.

A contribution to the knowledge of Aleurochiton aceris, its host relations, etc., M. WOLFF (*Centbl. Bakt. [etc.], 2. Abt., 26 (1910), No. 20–24, pp. 643–667, pls. 2, figs. 17*).—This paper deals with the morphology and biology of an aleyrodid (*A. aceris*), which was the source of considerable injury to maples (*Acer platanoides*) in the provinces of West Prussia and Posen in 1909. A pteromalid parasite bred from the pupa is described as *Urolepis schultzei* n. sp.

Notes on California Coccidæ, V, E. O. ESSIG (*Pomona Jour. Ent., 2 (1910), No. 2, pp. 209–222, figs. 14*).—In this part (E. S. R., 23, p. 259) 9 species are noted of which *Ripersia smithii*, taken from wild rye (*Elymus condensatus*) in Ventura County, is described as new.

Notes on silkworm rearing in the Punjab (*Dept. Agr. Punjab, Bul. 3, 1910, pp. III+19*).—Part 1 of this bulletin discusses the cultivation and care of mulberry trees and part 2 the care of the silkworm.

The silk industry of Persia, F. LAFONT and H. L. RABINO (*Ann. École Nat. Agr. Montpellier, n. ser., 8 (1909), No. 4, pp. 292–319, figs. 9; 9 (1909), No. 1, pp. 5–69, figs. 23; 9 (1909–10), No. 2–3, pp. 152–208, map. 1*).—A detailed account.

A contribution to the study of diseases of silkworms; Tricholyga sorbillans in Cochin China, BROQUET and VILLENEUVE (*Bul. Soc. Path. Exot., 3 (1910), No. 10, pp. 766–773*).—This tachinid has been found to parasitize silkworms at Daii-Giaï in the Province of Bien-hoa. The eggs are deposited upon the silkworms, the larvæ hatching out within 24 hours and entering the body of the host.

The silkworm moth "rouge" in Cochin China, C. BROQUET (*Ann. Inst. Pasteur, 24 (1910), No. 7, pp. 529–542, pl. 1*).—The author here considers a disease of the silkworm moth that occurs in the region of Tân Châu, Cochin China, and is due to a chromogenic cocco-bacillus, which he calls "rouge." This organism was isolated from the atmosphere at the sericultural station at Tân Châu and from the humid surface of cocoons from which moths had emerged. The loss caused, however, is not so great as that due to pebrine and to the tachinid parasite *Tricholyga grandis*.

List of Sphingidæ of America north of Mexico, W. BARNES and J. MCDUNNOUGH (*Psyche, 17 (1910), No. 5, pp. 190–206*).—Ninety-six species are listed with locality records of their collection.

The snow-white linden moth, G. W. Herrick (*New York Cornell Sta. Bul. 286, pp. 49–64, figs. 5*).—Since the introduction of the English sparrow, but little injury appears to have been done by the snow-white linden moth, also known as the elm spanworm, until 1907, when it appeared as a serious pest to forest trees and has since been very abundant and injurious.

In this bulletin the author deals with its occurrence, injury, danger as a fruit pest, distribution, food plants, life history and habits, natural enemies, and control. It appears to be widely distributed over the middle and eastern parts of the United States and occurs in Canada. The larvæ infest a great variety of forest trees, apparently somewhat preferring beech and maple and have been found on elm, linden, chestnut, hickory, ash, apple, birch, and others. The author considers it quite probable that this insect may in the future become of considerable importance as a fruit pest.

The eggs are deposited during the latter part of June and first part of July on the underside of the branches in masses of from 20 to 100 or more and commence to hatch during the latter half of April. Six caterpillars observed began spinning their cocoons May 30, June 1, 2, 3, 6, and 7, respectively, changing to pupæ about 3 days later. The 6 pupæ required from 13 to 16 days for their transformation to adults. In regard to parasites the author states that he has bred but a single specimen (*Pimpla conquisitor*).

It is thought that the use of arsenate of lead, 3 lbs. to 50 gal. of water, will control this pest on shade trees.

A chronologically arranged bibliography is appended.

The celery leaf-tyer, H. J. Quayle (*Cal. Cult., 35 (1910), No. 16, p. 371*).—A brief account is given of *Phlyctænia ferrugalis.* Paris green in the proportion of from 1 to 1⅓ lbs. to 200 gal. of water was found to be the most practical insecticide and is recommended for use.

Experiments in the storage of seed potatoes, H. M. Lefroy and G. Evans (*Agr. Jour. India, 5 (1910), No. 1, pp. 19–28, pl. 1*).—The authors report investigations that were made necessary by attacks of the potato moth (*Phthorimæa operculella*). This pest attacks stored potatoes freely and has become well established in India where potatoes are grown.

Cankerworm experiments of 1909, W. H. Goodwin (*Ohio State Hort. Soc. Ann. Rpt., 43 (1910), pp. 105, 106*).—A brief report of banding and spraying experiments.

Codling moth control in California, C. W. Woodworth (*Jour. Econ. Ent., 3 (1910), No. 6, pp. 470–473*).—It is shown that the climatic conditions in the Pajaro Valley are such that none of the commercial brands of arsenate of lead containing arsenic acid soluble in ammonia can be safely used. A method of manufacture has been worked out by means of which a saturated lead salt is uniformly obtained.

The blossoming period in this valley extends over such a long period that the first fruit set usually are so far advanced as to render the poisoning of the calyx cup impossible before half of the buds are open. The Watsonville spraying program, which absolutely ignores the blossom-cup work, usually begins with an application about the time the last blossoms appear, usually long after the calyx lobes of all the fruit that will set have closed. "This spray may be followed by 1 or 2 applications at intervals of a month or 6 weeks, the number varying with the season and the portion of the valley. . . . The minimum sprayings that give good results in any part of the valley are 3, 2 for the first brood and 1 in August, and the maximum is 6, 3 for the spring and 3 in the summer, and except for the early spring applications must be strictly neutral arsenate of lead, one containing no ammonia-soluble arsenic."

Recent experiments with the codling moth, E. P. FELT (*Jour. Econ. Ent., 3 (1910), No. 6, pp. 474–477*).—A detailed account of the experiments previously noted from another source (E. S. R., 24, p. 257).

Spraying for the codling moth, A. L. MELANDER (*Washington Sta. Popular Bul. 30, pp. 4, figs. 3*).—This publication replaces Popular Bulletin 17 previously noted (E. S. R., 22, p. 461).

Medullary spots: A contribution to the life history of some cambium miners, J. G. GROSSENBACHER (*New York State Sta. Tech. Bul. 15, pp. 49–65, pls. 5*).—In the course of life-history studies of a fungus that causes a blight of currants (*Ribes vulgare*), dark-brown streaks were commonly observed in living young canes during late summer. Streaks or mines of the same type were also found in the European black currant (*R. nigrum*) and the European gooseberry (*R. grossularia*). During the summer of 1910 insect larvæ were obtained from Ribes, which proved to be caterpillars of the tineid moth, *Opostega nonstrigella*. Larvæ obtained from the cambium of various trees in which they mine were found to differ from the Ribes miners. The author briefly reviews the German botanical literature relating to a similar injury to trees, the specific cause of which has not been definitely determined.

The author's investigations began in the late summer of 1907, at which time large numbers of rank growing currant shoots in some regions of the Hudson River Valley had their distal portions defoliated while other leaves were still green. Many such shoots were found to have pairs of more or less parallel dark streaks in the outer wood, extending lengthwise the canes from 7 to 18 cm. and which on removal of the bark and outer wood were found to form one continuous line which had well-rounded turns at both its distal and proximal ends. During 1908 and 1909 it was found that in some places as high as from 10 to 60 per cent of the currant canes contained one or more of the mines; older, diseased, or blighted plantations and others adjoining them had a much higher percentage of their canes mined than plantations which were young and scattered.

The investigations were continued but none of the miners were discovered until May, 1910, when it was comparatively easy to find from 1 to 5 larvæ in at least 50 per cent of the shoots in a plantation near Milton, N. Y. "A few days later great numbers were found in a large and rather crowded plantation of *R. vulgare*, *R. nigrum*, and *R. grossularia* planted among fruit trees in Rochester. By making cross-sections of 2 to 5 year old canes it became evident that they all had been mined more or less each season, as the presence of a pair of dark spots in the different annual wood-rings indicated. Many of the large *R. nigrum* bushes had the larvæ present in 85 to 95 per cent of their canes, while *R. vulgare* and *R. grossularia* in about 40 to 65 per cent. But in some parts of the plantation *R. nigrum* seemed to be entirely free from cambium miners, and the other species had but very few."

The author's studies indicate that the eggs are laid in or on the bark of Ribes from about the last week of April to nearly the middle of May and that the larvæ mine in the cambial cylinder about 4 to 6 weeks, while the pupal stage is passed in the ground and seems to last about 2 to 3 weeks, ending by July 10. The evidence indicates that the adults which emerge during June and July live through the winter although it is possible that some pupæ hibernate in the ground and emerge the following spring. However, as only empty cocoons were found in the ground during August, the author suggests the possibility of there being a second brood which feeds in the cambial cylinder of some species of plants that continue their cambial activity during late summer. The mines have been found to occur in the wood of both old and young Ribes canes, anywhere from the tip to the ground. In *R. nigrum* they are most common in

1-year old wood while in *R. vulgare* and *R. grossularia* the current season's growth seems to have them in greater numbers.

The economic relations of these insects may prove of some importance since the currant miner has been shown to afford entrance for a fungus which is thus enabled to kill gooseberry shoots. "Direct injury to currants and gooseberries is probably not very serious and of course the direct injury to plums, cherries, etc., by other cambium miners is no doubt even less, because the mines are so small when compared to the size of the plants."

Technical descriptions are given of the larva, cocoon, and moth together with an account of the histological modification resulting from the mining. Brief mention is also made of observations of cambium miners of Prunus and Cratægus.

The life history of Roubaudia rufescens, a tachinid parasite of African social wasps of the genera Icaria and Belonogaster, E. ROUBAUD (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 21, pp. 956–958*).—An account of the life history and habits of a viviparous tachinid.

The larvæ are deposited in the cells of the wasps' nests and at once attack the eggs or young wasp larvæ. It is said that this tachinid fly is often responsible for the total disappearance of these wasps. A small chalcidid hyperparasite, apparently undescribed, often attacks the fly, as many as a hundred developing in a single puparium.

The bee-flies (Bombyliidæ) in their relations to flowers, S. GRAENICHER (*Bul. Wis. Nat. Hist. Soc. [n. ser.], 8 (1910), No. 2, pp. 91–101*).—This account is based on a comparison of observations made by the author in Milwaukee County, Wis., with the very extensive observations of Robertson in Carlinville, Macoupin County, in southern Illinois.

Azolla v. mosquitoes, J. B. SMITH (*Ent. News, 21 (1910), No. 10, pp. 437–441, pl. 1*).—Having conducted an investigation in Europe, the author concludes that the aquatic plant (*Azolla* sp.) experimented with in Germany is useless in dealing with the local city and the salt-marsh mosquito problem.

On the absence of a vesicant in the ether extract obtainable from mosquitoes, J. O. W. BARRATT (*Ann. Trop. Med. and Par., 4 (1910), No. 2, pp. 177, 178*).—The author concludes that the irritant action of mosquito bites can not be attributed to the existence in these insects of any substance possessing a vesicant action.

The prevention of malaria, R. ROSS (*London, 1910, pp. XVII+669, pls. 31, figs. 11*).—The first part of this work consists of chapters on the history of malaria, a summary of facts regarding it, fundamental observations and experiments, the parasitic invasion in man, malaria in the community, and prevention. The concluding chapter, which composes nearly half the work, consists of special reports upon campaigns against malarial mosquitoes that have been conducted in various countries. The authors of these reports and the sections represented are as follows: United States, by L. O. Howard; Panama, by W. C. Gorgas and J. A. Le Prince; West Indies, by R. Boyce; Jamaica, by W. T. Prout; Amazon region, by H. W. Thomas; South Brazil, by O. Cruz; Spain, by I. MacDonald; Italy, by A. Celli; Greece, by C. Savas; German possessions, by C. Schilling; French possessions, by E. Sergent; Egypt, by H. C. Ross; Khartum, by A. Balfour; South Africa, by L. Bostock; Durban, by P. Murison; Malay States, by M. Watson; Formosa, by T. Takaki; prevention of malaria in troops in war, by C. H. Melville; and prevention of malaria among troops in peace, by C. E. P. Fowler.

The appendix includes articles on Suggested Terminology to the Phenomena of Cytogenesis, Notes on the Malaria-bearing Anophelines, Examples of Legislation, and Notes.

The Chrysomelidæ and Coccinellidæ of the Philippines, J. WEISE (*Philippine Jour. Sci., D. Ethnol., Anthropol., and Gen. Biol., 5 (1910), No. 4, pp. 223–232*).—This article deals with 15 species of Chrysomelidæ, 6 being described as new, and 13 species of Coccinellidæ, of which 5 are described as new.

The Rutelidæ of the Philippine Islands, F. OHAUS (*Philippine Jour. Sci., D. Ethnol., Anthropol., and Gen. Biol., 5 (1910), No. 4, pp. 232–262*).—Twenty-two species and 1 variety are described as new to science, a total of 68 species being listed as occurring in these islands.

On some phases of parasitism displayed by insect enemies of weevils, W. D. PIERCE (*Jour. Econ. Ent., 3 (1910), No. 6, pp. 451–458*).—The author presents examples of superparasitism, as recently defined by Fiske (E. S. R., 23, p. 358), that have come to his attention. The various examples are classified in such a manner as to show the many ways in which parasites may interact upon each other.

On the life history of the alfalfa leaf-weevil, E. G. TITUS (*Jour. Econ. Ent., 3 (1910), No. 6, pp. 459–470*).—These data are summarized in the account previously noted (E. S. R., 24, p. 458).

The color sense of the honeybee.—Can bees distinguish colors? J. H. LOVELL (*Amer. Nat., 44 (1910), No. 527, pp. 673–692*).—In order to determine whether bees are capable of distinguishing different colors, and continuing previous work (E. S. R., 21, p. 763), the author conducted a series of experiments with glass slides of different colors that were rendered attractive by patches of honey.

He concludes that bees easily distinguish colors whether they are artificial, such as paints, dyes, etc., or natural ("chlorophyll") colors. They are more strongly influenced by colored slides than by those without color. Bees which have been accustomed to visit a certain color tend to return to it habitually—they exhibit color fidelity. This habit, however, does not become obsessional, since they quickly learn not to discriminate between colors when this is for their advantage.

The parthenogenesis of honeybees, K. W. VON DALLA TORRE (*Zool. Zentbl., 17 (1910), No. 16–17, pp. 485–502*).—The literature on the subject is reviewed and a bibliography given.

Notes on the nesting habits of Bembex nubilipennis, J. B. PARKER (*Ohio Nat., 10 (1910), No. 7, pp. 163–165*).—The author concludes that this wasp rears but one larva at a time, although it is possible that it constructs and attends 2 or more burrows simultaneously.

"The food of the larva, as shown by the nests opened, consist wholly of flies, and it seems that certain females show a preference for a particular kind of fly. In one nest only house flies were found; in a second the majority were stable flies; in a third, flesh flies; in a fourth, tachina flies. The wings, legs, and usually the thorax of the fly are not consumed by the larval wasp. The remains of 41 flies, of which most, perhaps all, were house flies, were taken from a chamber containing an almost mature larva, and doubtless these were not the total number of flies consumed by this individual."

Ten untouched flies taken from a nest containing a half grown larva represented the following species: *Euphorocera claripennis*, *Pseudopyrelia cornicina*, *Sarcophaga assidua*, and *S. helicis*. Although no parasites of this wasp were found, in 2 instances the author discovered small larvæ feeding on the flies in a chamber containing an immature larval wasp.

Scutellista cyanea, H. J. QUAYLE (*Jour. Econ. Ent., 3 (1910), No. 6, pp. 446–451*).—While this is the most important insect enemy of the black scale in California, from 75 to 80 per cent of the scale frequently being parasitized, the author states that from a commercial standpoint it is not often a very important factor in the control of the scale.

In describing its life history and habits, it is stated that this chalcidid may reproduce parthenogenetically. In midsummer the egg period was found to be 5 days, the larval 16, the pupal 15, and the adult 9 days, a total of 45 days for the life cycle from the egg to the death of the adult.

Two new species of African parasitic Hymenoptera, J. C. CRAWFORD (*Canad. Ent., 42 (1910), No. 7, pp. 222, 223*).—The author describes *Scelio howardi*, reared from the eggs of *Cyrtacanthacris septemfasciata*, and *Tetrastichus periplanetæ*, from the eggs of *Periplaneta americana*, together with numerous specimens of *T. hagenowii*, as new.

Notes and descriptions of North American parasitic Hymenoptera, IX, C. T. BRUES (*Bul. Wis. Nat. Hist. Soc., [n. ser.], 8 (1910), No. 2, pp. 67–85, figs. 13*).—The author describes 13 species as new, one of which (*Cheiropachys obscuripes*) was reared from a peach bark beetle (probably *Phlœotribus liminaris*) at Douglas, Mich.

First introduction of the Blastophaga, W. T. SWINGLE and G. P. RIXFORD (*Cal. Cult., 35 (1910), No. 26, pp. 659, 664, 665*).—The authors present evidence to show that *Blastophaga grossorum* has been established and breeding in the San Joaquin Valley for over 40 years.

The plain facts of fig wasp history, G. C. ROEDING (*Cal. Cult., 35 (1910), No. 26, pp. 659, 665*).—The account noted above is reviewed. The author concludes "that there is absolutely no foundation for the claims which have been made concerning the early introduction of the Blastophaga into California."

A phytoptid gall of Artemisia californica, H. V. M. HALL (*Pomona Jour. Ent., 2 (1910), No. 3, pp. 280, 281, fig. 1*).—*Eriophyes californica*, which causes a white or pinkish swelling on one side of the leaf of *A. californica*, is described as new. It is said to be very abundant at Claremont, Cal.

Note on the finding of Hæmaphysalis punctata at Winnipeg, Manitoba, S. HADWEN (*Canad. Ent., 42 (1910), No. 7, pp. 221, 222, pl. 1*).—*H. punctata*, a tick common in England and certain European countries, is recorded from North America for the first time, the specimens having been collected from cattle at Winnipeg, Manitoba.

The importance of this discovery lies in the possibility of its transmitting piroplasmosis of cattle in Canada as it has been shown to do in England.

Ticks and practical measures for their prevention, A. FREDHOLM (*Proc. Agr. Soc. Trinidad and Tobago, 10 (1910), No. 7, pp. 239–292*).—This article is largely based on the publications of R. Newstead and H. H. Cousins, previously noted (E. S. R., 22, p. 558; 23, p. 766).

It is said that ticks are not so great a pest in Trinidad as in Jamaica, this being due to the fact that the cattle industry is not so far advanced. Texas fever has been introduced into Trinidad on a few occasions but has never assumed epidemic proportions. "Energetic measures have been taken at once to suppress it and they have been successful owing, probably, in no small degree to the fact that the cattle industry is not extensive."

An American intermediate host for Hymenolepis diminuta, W. S. NICKERSON (*Abs. in Science, n. ser., 33 (1911), No. 842, p. 271*).—The author's experiments show that in America at least 2 different genera of Myriapoda may act as intermediate hosts for *H. diminuta*, the common tapeworm of the rat, which is also an occasional human parasite. It has previously been shown in Europe that its cercocystis stage may be passed in several insects, namely, the meal moth and its larva (Asopia), an earwig (Anisolabis), and beetles (Akis and Scaurus), Asopia being the form that commonly serves as an intermediate host.

Fumigation studies, II, III, W. M. Pierce (*Pomona Jour. Ent., 2 (1910), Nos. 2, pp. 175–178; 3, pp. 241–245, figs. 6*).—In the second paper (E. S. R., 23, p. 565) the author discusses the question "Does ordinary contract fumigation pay?" and in the third the estimation of the cubic contents of fumigation tents.

Division of nursery and orchard inspection, N. E. Shaw (*Ann. Rpt. Ohio Bd. Agr., 64 (1909), pp. 619–658*).—Details of the work of the year are briefly reported, lists of Ohio nurserymen, certified agents, and certified dealers being appended.

FOODS—HUMAN NUTRITION.

Fifteenth report on food products and third report on drug products, 1910, J. P. Street (*Connecticut State Sta. Rpt. 1909–10, pt. 6, pp. 455–582*).—Details are given of the examination under the state pure food law of a large number of samples of canned goods, flavoring extracts, ice cream cones, mince-meat, catsup, miscellaneous food products, and a large number of drug products.

In the case of canned peas, 111 samples, representing as many brands and the product of 73 manufacturers or jobbers, were submitted to a physical and chemical examination. Fourteen of these samples were of foreign and 97 of domestic packing. The drained peas averaged 364 gm. in weight per can, and the liquor 206 gm. The average cost per can was 16.8 cts. "The drained peas showed normal weight in 34 per cent of the 92 samples packed in No. 2 cans, excess weight in 5 per cent, and a tendency toward short weight in 61 per cent. Three samples showed a great deficiency in fill of peas."

In no case was the liquor perfectly clear. In 10 samples it was slightly cloudy, in 63 cloudy; in 33 thick, and in 5 very thick and pasty. The solid matter of the pea liquor constituted on an average 6.67 per cent of the total, with an average composition of protein 23, sugar 37, starch 23, pea ash 5, and sodium chlorid 12 per cent. "In 56 samples the pea liquor indicated the presence of glucose, ranging from 0.27 to 1.30 per cent. In no case was glucose declared on the label.

"The liquor contained on the average 16 per cent of the total solids of the canned peas. Ten per cent of the starch and 16 per cent of the protein of the peas are lost in the liquor [if discarded]."

The drained peas contained on an average water 80.86, starch 7.64, and sodium chlorid 0.58 per cent.

"In the smaller, less mature peas the fiber, sugar, and ash are generally higher, while the starch is higher in the more mature peas. In 48 samples the use of sugar was either declared on the label, or indicated in the brand name; in 29 of the other 63 samples the sugar ranged from 12.27 to 24.49 per cent in the dry matter, indicating added sugar. On the average there is quite a close relation between the amount of water and starch in the drained peas and the amount of starch in the liquor. The average water steadily decreases as the starch increases."

In the samples examined the starch content ranged from 21 to over 50 per cent on a dry basis. Thirty-five samples contained 45 per cent or more starch on a dry basis, of which 16 showed by their high starch content, thick liquor, hardness of the peas, prominence of the cotyledons, and low water content that they were either "soaked peas" or overmature peas of inferior quality.

"The larger, more mature peas contain the most actual nutriment, a can of 'marrowfats' supplying 385 calories, a can of 'petits pois' 157 calories. The cost of 100 calories in the 'marrowfats' is 2.9 cts., in the 'petits pois', 12.1 cts."

Lead was not found with positive certainty in any sample. Copper was found in 14 samples, all of foreign packing, the amount ranging from 8 to 67 mg.

Tin was found in weighable quantities, the amount ranging from 2 to 395 mg. per kilogram of drained peas. Of these samples 13 also contained copper. In the peas packed abroad the average tin content was 113 mg. and in those packed in the United States 28 mg. per kilogram.

In the case of the ice cream cones tests were made for benzoic, salicylic, and boric acids, saccharin, and artificial color, in addition to the usual food analysis. In 22 of the 27 samples examined no adulteration was noted, although in 2 there was some question as to the addition of coloring matter. "One of the adulterated samples contained a coal-tar dye and 4 boric acid. There is no necessity for using any chemical preservative in the manufacture of the cones, and the presence of the boric acid is probably traceable to the eggs used in making the cones. Whatever the source, its presence in the cones is highly objectionable and is clearly contrary to the law. It is interesting to note that a duplicate purchase of one brand of the cones, containing boric acid, from the same dealer a month later, showed no boric acid."

From the study of catsups, which included 74 samples, a tentative standard is suggested, namely, "that pure tomato catsup should contain in the salt-free dry substance not more than 15 per cent insoluble solids, not more than 7 per cent ash, not more than 4 per cent fiber, and not more than 12 per cent protein; the ratio of insoluble to total salt-free solids should not be less than 1 : 7."

As regards cost, "the contents of all the bottles were weighed, and from this data the cost per pound of catsup calculated, which ranged from 5.6 to 25.7 cts. When the content of total solids is considered, it is evident that the cheapness of most of the low-priced catsups is more apparent than real."

A number of gluten preparations were examined including gluten bread and diabetic bread. The starch content ranged from 33.66 in the case of the diabetic bread to 69.21 per cent in a macaroni product.

"None of these samples is particularly to be recommended to diabetics or to those requiring a diet low in starch. The gluten bread and diabetic bread are by far the most satisfactory preparations, but even in these the starch is much too high."

Fifth annual report of the food and drug laboratories of the laboratory of hygiene, H. E. Barnard (*Mo. Bul. Ind. Bd. Health, 13 (1910), No. 10, pp. 114–124*).—During the year a total of 2,442 samples of food products were examined, of which 754 were declared illegal. The report contains summaries of the work with milk and other dairy products, flour, catsups, oysters, sausage, vinegar, and other products.

Report of food and drug inspection, C. D. Howard (*N. H. Sanit. Bul., 3 (1910), No. 9, pp. 150–161*).—Out of a total of 206 samples of butter, flavoring extracts, oysters, and other food products, and of drugs and proprietary remedies, 87 samples were found which did not conform to the requirements of the state law.

Report of food and drug inspection, C. D. Howard (*N. H. Sanit. Bul., 3 (1910), No. 10, pp. 170–183*).—Data are reported regarding the examination of a number of samples of cocoa, dairy products, maple sirup, and other food products, and also of drugs and proprietary articles. Out of a total of 131 samples 79 were found to be in nonconformity to the requirements of the state law.

Information is also given regarding the use of color and flour in Bologna sausage by local sausage makers.

Report of the division of food and drugs, R. B. Fitz-Randolph (*Ann. Rpt. Bd. Health N. J., 33 (1909), pp. 173–195*).—According to the summary presented, 752 samples out of a total of 7,568 samples of milk and cream, foods other than milk, and drugs examined were found to be below standard.

[Analyses of food materials and other pure food work], J. C. MAHR (*Ann. Rpt. Food and Drug Com. Okla., 1 (1909), pp. 64*).—Results are reported under the provisions of the state law of a large number of samples of flavoring extracts, oil, spices, and other food materials, of drugs, etc.

Data are also included regarding sanitary inspection and various topics concerned with the state pure food and drug work.

Food inspection decision (*U. S. Dept. Agr., Food Insp. Decision 130, pp. 2*).—This decision contains an amendment to Regulation 5 on hearings under the Food and Drugs Act (E. S. R., 18, p. 459).

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 710–712, pp. 2 each; 714–716, pp. 2 each*).—These notices of judgment have to do with the adulteration of jam; the misbranding of Hochheimer wine and of a product called "hair grower;" and the adulteration and misbranding of olive oil, spirits of turpentine, and coffee and chicory compound.

The milling quality of Washington wheats, II, R. W. THATCHER (*Washington Sta. Popular Bul. 29, pp. 4*).—This is a popular account of material summarized in a bulletin previously noted (E. S. R., 23, p. 467).

Amount and distribution of nitrogenous material in local grown wheats, M. P. NEUMANN (*Ztschr. Gesam. Getreidew., 2 (1910), No. 11, pp. 268–272*).—The results of studies of German wheats are reported.

According to the author's conclusions, neither the gliadin content nor the percentage of water-soluble material is a characteristic which serves for the identification of different sorts of wheat, and neither factor serves as a measure of bread-making quality. In general, there are variations in the distribution of both water-soluble and alcohol-soluble protein in different sorts of wheat, and analytical methods are not accurate enough to interpret the meaning of the variations with respect to the flour.

Work done in the testing of wheat and flour in the chemical laboratory of the Department of Agriculture, New South Wales, F. B. GUTHRIE (*Bul. Imp. Inst. [So. Kensington], 8 (1910), No. 2, pp. 139, 140*).—The results of comparative studies of wheat and similar work are briefly reported. See for instance that previously noted (E. S. R., 22, p. 763).

Testing baker's yeasts, OLGA KNISCHEWSKY (*Ztschr. Gesam. Getreidew., 2 (1910), No. 11, pp. 272–276*).—A number of sorts of yeast were examined.

The preparation and use of maize and maize products as food, J. SCHINDLER (*Anleitung zur Beurteilung des Maises und seiner Mahlprodukte als Nahrungsmittel. Innsbruck, 1909, pp. 43, pl. 1*).—A summary of data regarding the use of maize and maize products for food purposes, with special reference to increasing the use of this cereal in Europe. A section is devoted to denatured spoiled Indian corn and corn meal.

[A new food product made from lobster], F. DEEDMEYER (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 3, pp. 42, 43*).—A canned lobster product is described which, it is said, consists of 0.6 lobster meat, 0.3 lobster liver, and 0.1 roe. The meat used is that portion attached to the lobster tail which, with the other ingredients mentioned, is usually rejected in lobster canning.

Examination of grape juice (*N. H. Sanit. Bul., 3 (1910), No. 11, pp. 199, 200*).—Analyses of 12 samples of commercial grape juice are reported.

The use of preservatives in food and their influence upon the body, A. J. J. VANDEVELDE and H. P. WIJSMAN (*Brussels, 1910, pp. 16*).—In a paper presented before the Second International Congress of Alimentary Hygiene and the Rational Nutrition of Man, Brussels, 1910, the authors summarize and discuss legislative enactments in different countries and other data bearing upon this subject.

The principal publications which treat of the use of preservatives in food and their effect upon the body, A. J. J. VANDEVELDE (*Brussels, 1910, pp. 14*).—This summary and digest of data was presented at the Second International Congress of Alimentary Hygiene and the Rational Nutrition of Man.

Food sanitation, J. S. ABBOTT (*Bul. Tex. Bd. Health, 4 (1910), No. 11, pp. 16–18*).—In connection with a discussion of the need for clean milk and the protection of food products during transportation and in market, the author briefly refers to the bacteriological examination he has made of samples of commercial milk, grapes, and berries exposed for sale on the sidewalks without protection from flies and street dust. He states that in every case pathological bacteria were found.

The occurrence and survival of micro-organisms on the surface of pastry and confectionery exposed to the air on streets and in public places, E. MAUREL (*Compt. Rend. Soc. Biol. [Paris], 69 (1910), No. 33, pp. 427–430*).—From experiments reported the author concludes that many bacteria are found on the surface of confectionery and pastry exposed for sale without protection and that the bacteria are capable of reproduction and may be dangerous.

Manual for army cooks, 1910, H. G. SHARPE ET AL. (*War Dept. [U. S.], Off. Com. Gen. Doc. 379, pp. 185, figs. 23*).—Kitchen equipment and devices are described, the cutting of meat discussed, and a large number of recipes given in quantities suitable for 60 men. Bills of fare are also suggested. Special sections are devoted to field cookery and to messing troops on railroad trains. Water cooling devices, improvised filters, and the experimental fireless cooker issued by the army subsistence department are described.

Tropical agriculture and cookery, MRS. F. R. RAMSDELL (*Nueva Gerona, Isle of Pines, 1909, pp. 56*).—The author has collected a number of recipes regarding the preparation of the avocado, cashew apple, chayote, breadfruit, and other vegetable foods used in the Tropics. In the case of the avocado the recipes includes directions for cooking the fruit as well as for serving it in the usual ways, for making pickle, and for extracting the oil, which it is said does not readily become rancid and can be used as an illuminant or for soap making.

Pellagra, A. MARIE, trans. by C. H. LAVINDER and J. W. BABCOCK (*Columbia, S. C., 1910, pp. 434, pls. 20, charts 4*).—This handbook summarizes and discusses a large amount of data regarding the history and geography of pellagra, the relation of the disease to corn, statistical matter, the results of studies of spoiled corn, and other related topics. The translators state that in its present form the volume contains additions to the text which are in every case indicated by inclosures in brackets, as well as additions in the form of a bibliography of pellagra literature, particularly of material published in English, some material in the form of appendixes, and illustrations. The volume contains a subject index and an index of authors cited.

Investigations on Bengal jail dietaries with some observations on the influence of dietary on the physical development and well-being of the people of Bengal, D. MCCAY (*Sci. Mem. Med. and Sanit. Depts. India, n. ser., 1910, No. 37, pp. 226, charts 15*).—Continuing investigations of the food of Indian natives (E. S. R., 20, p. 767), the author has carried on dietary studies covering from 7 to 52 days, with native prisoners in 8 jails. The composition of a number of foods was determined, including particularly rice, wheat products, and legumes. Analyses, including calorimetric studies of duplicate samples of these foods, have been noted from another source (E. S. R., 23, p. 169).

The diet of the Bengali prisoners, in conformity with local food customs, consisted chiefly of rice, with dried legumes of different sorts and some vegetables.

The Behari diet included wheat ata (flour) and sometimes Indian corn also, as these natives are a wheat-eating rather than a rice-eating people, and hence are accustomed to a diet with somewhat more protein than the Bengali. In round numbers, the author states that the diets of Bengali prisoners supplied 93 gm. protein, of which 49 gm. was assimilated, and those of Beharis 106 gm. with 60 gm. assimilated. The fuel values of the two diets were 3,508 and 3,415 calories, respectively.

One cause of the low absorption of protein, according to the author, is the fact that the full diet is so bulky. In his opinion, much evidence has been advanced to show that a mere decrease in the bulk of the diet was sufficient to permit of a greater relative and absolute absorption of protein. Extensive experiments were carried on to determine the combinations of typical native foods which would give the maximum absorption in the diet. For diets of the Lower Bengal type the optimum quantity of rice was found to be 18 oz. and of dal (dried legumes of different sorts) about 5 oz. per man daily.

According to the author, the experimental work showed that "the absorption from the diets in which the foodstuffs were combined in the proper quantities was very much superior to that of the present scales of dietaries [in which this was not the case]; also that the percentage absorption was very much higher—a great gain, as a much lessened amount of nitrogen remains to undergo intestinal putrefaction."

A larger proportion of protein is regarded as essential. As the author points out, when the diet consists very largely of rice, the amount of protein may be easily increased by the use of wheat, but where the quantity of wheat is already quite sufficient, as in the Behar jails, the only way of reducing the amount of legume is to substitute some form of animal protein for it, and fish was suggested. A special experiment was made in one of the jails with some 200 prisoners, covering 350 days, in which fish or wheat replaced part of the rice and legumes usually eaten.

From the data obtained the author concludes that "a diminution in the bulk of the present type of diet is urgently called for, and that by the substitution of a more assimilable form of protein in the form of fish or wheat ata for the excess of rice and dal, the general well-being and physical condition of the prisoners will be increased and placed on a higher level. The results also show that a change in the dietary, such as we have suggested, can be quite simply and easily carried out, and that, in a very short time, the early feeling of emptiness complained of passes away, the dilatation of the stomach so commonly met with in a rice-eating people becoming distinctly diminished."

"While the addition of an animal protein is not by any means essential, at the same time there is little doubt that, if it were economically possible thus to permit of a reduction of the amount of dal in both Lower Bengal and Behar dietaries, the general health of the jails would improve. From investigations on the microscopic compositions of the feces it would appear that the dal granule is the most difficult of all to break down, and that the slightest lowering of the general health is usually accompanied by the passage of undigested dal."

With respect to the cooking of the vegetable food materials such as were used in the dietaries the author states that it was not possible to make any observations; "but from the evidence afforded by other observers we would recommend that the dal be ground to meal before being cooked. . . . Lentils given after soaking and boiling show over 40 per cent of the protein unabsorbed; whereas when ground to lentil meal only from 8 to 10 per cent of the lentil protein passes out in the feces."

In connection with the work, the author also paid especial attention to the relationship between the amount of rice eaten and the quantity of urine excreted, the average amount of uric acid and protein excreted, the relationship of urea and of ammonia to total renal nitrogen, the relative absorption of protein by Hindus and Mohammedans on an animal diet, and similar matters. From the results obtained it would appear that the Mohammedans, who are accustomed to animal protein in their diet, absorb a higher percentage of it than the vegetarian Hindus, so, according to the author, the inference is justified "that the degree of nitrogen absorption depends largely on the manner in which the protein of the diet is made up, and not on the absorptive power of the intestinal tract of one class of people being much superior to that of another class."

In accordance with local customs, a large amount of salt (about 30 gm. per day) was supplied to the Bengali prisoners, which, as the author points out, is an excessive quantity, "and much beyond the physiological needs of the body." Accordingly, tests were made with some of the subjects in which different amounts of salt were supplied. According to the author's summary, "the evidence is strong that a large ingestion of salt in the diet entails an increase in the body weight, an increase in the quantity of urine secreted, and a marked increase in the amount of salt eliminated by the skin.

"The quantity of chlorids passed in the feces is very constant, and bears no relation to the total intake of salt in the food; it, in all probability, varies with the percentage of the foodstuffs that passes out unabsorbed; so that, in those experiments where the same foods in the same quantities were given throughout, the salt in the feces is practically constant. It is a very small amount—only about 0.5 gm. per man daily. Practically complete absorption of the added salt takes place whether the amount is large or small. . . .

"The rational indication would therefore appear to be to give the amount of salt which the kidneys are best able to deal with, and which throws no great strain on them. . . . The addition of 10 gm. of salt to the daily diet shows the lowest elimination by the skin and would therefore mean, if our deduction is correct, that the kidneys are easily able to deal with that amount without falling back to any great extent on the assistance of the skin."

From a series of studies undertaken on the excretion of salt in perspiration, the author concludes that "under normal conditions an excretion of 2 gm. of NaCl by the skin is a large amount and a good deal beyond the average excretion."

In general, the author believes that "with a purely vegetable diet more salt is required than in European diet scales."

On the basis of the results of his investigations, the author discusses the problem of the economical and satisfactory feeding of Bengali prisoners and the relationship of food to physical development, paying attention especially to criticisms which have been made to the conclusions presented in his earlier report.

"From a study of the urine, blood, physical development and general capability of the Bengali we expressed the conviction that the diet on which he subsists was largely to blame for his miserably poor physique and want of vigor. Nothing we have learned in this further study has tended to controvert that opinion; on the contrary, the more the subject has been gone into the stronger the evidence becomes of its correctness."

In connection with his study of the Bengali and Behari who dwell in the plains, the author has collected data regarding the diet of hill tribes of Bengal, where, as a rule, the diet is more generous than in the plains. Making allowance for the difference in climate and for other factors which have been suggested as affecting the condition of the people, the author is decidedly of the opinion that the better physical condition of the hill people is due to their more generous diet and the more abundant protein it supplies.

As regards the suggestions which have been advanced that the condition of the Bengali may be due to something besides diet, the author states that while admitting the probable force of some of them, he has largely eliminated such factors by contrasting the Bengali with individuals, tribes, or races in which all these factors were identical except that the diet was more generous, particularly with respect to protein.

In general, the author concludes that one of the most interesting questions which arises in connection with his work is the relationship of the degree of nitrogen metabolism to physical development and the general characteristics of a people or a race, and he believes that his investigation has brought forward a good deal of evidence "to show that an intimate connection does exist, and that diet is a powerful factor in determining the position of a tribe or race in the scale of mankind."

Food of the working men in Belgium, E. WAXWEILER (*Bul. Inst. Internat. Statis. [The Hague], 18 (1910), No. 2, pp. 462-473*).—The results of the study carried on by the Solvay Institute of the food of more than a thousand working men of various trades in different regions in Belgium (E. S. R., 19, p. 562) are summarized and discussed. On the basis of the data presented the author recommends an increased use of meat in the dietary, particularly in the case of those whose work requires mental effort.

Hearings held before the Select Committee of the Senate relative to wages and prices of commodities (*Washington: U. S. Senate Select Committee, 1910, vol. 1, pp. 658; 2, pp. 111+659-875*).—A full report is given of the investigations carried on by the Senate committee appointed at the Sixty-first Congress, second session, to investigate the question of wages and prices of commodities.

Topical digest of evidence submitted in hearings held before the Select Committee of the Senate relative to wages and prices of commodities (*Washington: U. S. Senate Select Committee, 1910, pp. XCV*).—This is a topical digest of the data presented in the above-mentioned reports.

Radiographic studies of the relation between the period of activity of the normal stomach and the sensation of hunger, M. HAUDEK and R. STIGLER (*Pflüger's Arch. Physiol., 133 (1910), No. 1-3, pp. 145-160, figs. 3*).—From the investigations reported the authors conclude that at least with healthy persons in middle life the period of digestive activity in the stomach is shorter when the sensation of hunger accompanies the taking of food than when this is not the case.

Studies on water drinking.—III, On the uric acid elimination following copious water drinking between meals, S. A. RULON, Jr., and P. B. HAWK (*Jour. Amer. Chem. Soc., 32 (1910), No. 12, pp. 1686-1691*).—Continuing the investigation previously noted (E. S. R., 23, p. 371), experiments were made with 2 young men.

In one case copious water drinking caused no change in the uric acid output, whereas a pronounced decrease in this excretion was observed with the other subject. This apparent decrease in the elimination of uric acid the authors attribute to the fact that the analytical method followed did not give high enough results owing to the extremely low density of the urine. "This interpretation has been substantiated by tests made in another connection.

"Upon those days when the urine for the 24-hour interval was collected in 5 subperiods, there was apparently no relation between the urine volume for the subperiod and the uric acid content. There was likewise no uniformity in the daily course of the uric acid excretion, the maximum output occurring on different days in the first, second, third, and fourth subperiods respectively. The maximum urine flow occurred uniformly in the second subperiod of those days on which large volumes of water were being ingested. This uniformity was not observed on the days of low water ingestion."

Concerning protein metabolism, F. FRANK and A. SCHITTENHELM (*Ztschr. Physiol. Chem., 70 (1910), No. 2-3, pp. 98–128, dgms. 6*).—In the experiments reported, which were made with man and animals (dogs), different kinds of protein flesh food were supplied.

According to the authors' conclusions, the results obtained lead to the belief that food protein should be similar to body protein in its composition, be easily acted upon by digestive ferments, and supply all the necessary cleavage products in proper proportion. The results are discussed with reference to the theory that the most economical protein would be that supplied by the flesh of the species fed, and the authors' conclusions are that such protein might be equal to some other satisfactory protein but not superior to it.

The relation between mineral metabolism and organic nutrients, E. BIERNACKI (*Wiener Klin. Wchnschr., 23 (1910), No. 23, pp. 850–854*).—A digest and discussion of recently published data, particularly the author's own investigations (E. S. R., 22, p. 370).

In general, the author emphasizes the importance of ash constituents in relation to normal metabolic processes. He believes that normal metabolism of mineral constituents is impossible without normal diet, that is, without a proper quantitative relationship between the protein, fat, and carbohydrates supplied.

The importance of cooking salt in metabolism, H. STRAUSS (*Berlin. Klin. Wchnschr., 47 (1910), No. 50, pp. 2292–2295*).—A digest of data on the relation of salt to nutrition, particularly with reference to pathological conditions.

The spleen in its relation to iron metabolism, R. ZIMMERMANN (*Fortgesetzte Beiträge zur Funktion der Milz als Organ des Eisenstoffwechsels. Inaug. Diss., Univ. Bern, 1909, pp. 44*).—According to the author's conclusions from experiments with normal dogs and with dogs with the spleen removed, this organ is concerned in the synthesis of iron products from the iron liberated by hemolysis, but this function of the spleen is not very pronounced. The investigations reported are discussed at length.

On the preservation of feces, P. E. HOWE, T. A. RUTHERFORD, and P. B. HAWK (*Jour. Amer. Chem. Soc., 32 (1910), No. 12, pp. 1683–1686*).—According to the authors' summary the method of collecting and preserving feces which involves the use of friction-top pails gives very satisfactory results, since it permits the analysis of fresh feces, prevents loss of moisture, maintains the nitrogen content practically unaltered for at least 20 days and frequently for a much longer period, and eliminates loss of material.

ANIMAL PRODUCTION.

On the production value of feeding stuffs, N. HANSSON (*Tidsskr. Norske Landbr., 17 (1910), No. 12, pp. 578–586*).—An address delivered at the meeting of the Society for Norway's Weal at Aas, October 4, 1910, giving a résumé of the author's studies of the subject (E. S. R., 20, pp. 475, 1065).

Definitions of feed stuffs (*Amer. Hay, Flour and Feed Jour., 18 (1911), No. 2, pp. 19, 20*).—A list of tentative definitions of feeding stuffs adopted in 1910 by the Association of Feed Control Officials (E. S. R., 24, p. 98).

Registered feeding stuffs (*Kansas Sta. Feeding Stuffs Buls. 10–16, pp. 4 each*).—These contain lists of feeding stuffs registered in the State and extracts from the state feeding stuffs law.

[Composition of East Indian feeds], J. DEKKER (*Teysmannia, 21 (1910), No. 2, pp. 103–105*).—In a table analyses are reported of rice, rice bran, coconut cake, peanut cake, the foliage of the coconut, cowpea, *Paspalum dilatatum*, *Panicum (maximum?)*, *Pollinia rufispica*, *Vigna catjang*, *Erythrina hypaphorus*, and *Hibiscus tibiaceus*.

The sword bean, P. BONAME (*Agr. Prat. Pays Chauds, 10 (1910), No. 92, pp. 370–378*).—Analysis of the sword or jack bean (*Canavalia ensiformis*) is reported and its value as a feeding stuff is discussed.

Shredding fodder (*Nebr. Farmer, 42 (1910), No. 51, pp. 1110, 1111*).—A discussion of the conditions under which it is desirable to shred corn fodder.

The shredder is used less than it was a few years ago because of the increase of silos; formerly large amounts of the fodder were spoiled because it was not properly cured. In the opinion of the author the shredder may be used when there is considerable dry fodder to be utilized from which the ears have been picked.

Beet pulp silage, L. VUAFLART (*Sucr. Indig. et Colon., 76 (1910), No. 4, pp. 76–78*).—Analyses of fresh beet pulp and of beet pulp silage are reported. The loss in weight which occurred after remaining in the silo nearly 5 months amounted to about 18 per cent, most of which was water. The chief losses in dry matter were pentosans, hexosans, amids, and undetermined extractives.

Olive pomace as a feeding stuff, J. CHAPELLE and J. RUBY (*Bul. Mens. Soc. Cent. Agr., Hort. et Acclim. Nice, 50 (1910), No. 11, pp. 395–398*).—A consideration of the feeding value of the residue of olives after the oil has been expressed. The amounts that may be fed per head and day are as follows: Cattle from 2 to 5 kg., calvs from 1 to 2 kg., sheep from 0.15 to 0.3 kg., and swine from 0.5 to 1.5 kg.

Cacao shells as a feeding stuff, B. SCHULZE (*Ztschr. Landw. Kammer Schlesien, 14 (1910), No. 47, pp. 1443, 1444*).—A note on the feeding value of these shells when removed from the cacao bean in the manufacture of chocolate.

On the value of molasses and molasses feeds in feeding work horses and dairy cows, N. HANSSON (*Meddel. Centralanst. Försöksr. Jordbruksområdet, No. 29, pp. 60*).—Feeding experiments are reported with molasses, molasses feed (50 per cent molasses, 35 to 40 per cent wheat bran, and 10 to 15 per cent palm-nut meal), and molasin (about 80 per cent molasses and 20 per cent peat litter).

In the case of either work horses or dairy cows the molasses proved to have a similar feeding value in whichever form it was given; the peat litter contained in the molasin did not, therefore, possess any nutritive value. The results of the experiments indicate that for dairy cows 1.2 kg. of molasses feed, about 1.3 kg. of average molasses with 50 per cent sugar, and at least 1.5 kg. of molasin with 40 per cent sugar may be considered equivalent to one feed unit (equal to 1 kg. of barley or Indian corn). For horses these feeds were found of somewhat higher feeding value, at least when fed in smaller quantities, 1 kg. of molasses and 1.2 to 1.3 kg. of molasin being found equivalent to 1 feed unit. The experiments corroborate the results of earlier investigations that feeds high in sugar are especially adapted for feeding work horses, on account of the high value and favorable dietetic influence of sugar for the production of muscular energy.

The acidity of gluten feeds, W. H. JORDAN (*New York State Sta. Tech. Bul. 16, pp. 67–79*).—The acidity of gluten feeds was found to be due to the addition of "steep water," a by-product obtained in the manufacture of corn products. Amino acids and phosphorus compounds were the cause of the acidity of the "steep water." The phosphorus compounds were thought to be a mixture of phosphates and phytates. Traces of mineral acids were found in the steep water, but they were present in such small quantities that they need not be considered as imparting any deleterious properties to the feed.

Concerning the knowledge of the digestion of cellulose, H. von Hoesslin (*Ztschr. Biol., 54 (1910), No. 7-9, pp. 395-398*).—In 2 experiments the percentage of cellulose fed to dogs which was recovered in the feces was 99.7 and 94.5, respectively, showing that the cellulose was practically undigested.

The decomposition of cellulose in the cecum of the horse, H. von Hoesslin and E. J. Lesser (*Ztschr. Biol., 54 (1910), No. 2-3, pp. 47-53; abs. in Zentbl. Physiol., 24 (1910), No. 16, p. 760*).—The experiments of the authors led to the same results as those obtained by Scheunert (E. S. R., 22, p. 474). The decomposition of cellulose in the cecum of the horse was ascribed to micro-organisms and not to enzyms.

General physiology, M. Verworn (*Allgemeine Physiologie. Jena, 1909, 5. ed., rev., pp. XVI+742, figs. 319*).—A new edition of this standard work on the fundamental principles which underlie plant and animal life, which has been so revised as to include recent investigations in physical and biological chemistry which have an important bearing on biology.

The science of life, J. A. Thomson (*London, [1910], pp. X+246*).—An outline of the history of investigations in physiology, embryology, heredity, palæontology, and related topics in order to "illustrate the growth of biology from an embryonic state of insignificance to a position which is central among the sciences, and full of influence even on the art of life."

History of biological theories, E. Rádl (*Geschichte der Biologischen Theorien. Leipsic, 1905, pt. 1, pp. VII+320; 1909, pt. 2, pp. X+604*).—An extensive historical summary of investigations and theories relating to cell structure, physiology, embryology, evolution, heredity, and allied topics. Part 1 covers the period from Aristotle to Erasmus Darwin and part 2 is confined to theories and discoveries of the nineteenth century.

Biologists are urged to pay more attention to historical studies because the true significance of results of investigations is more easily understood if correlated with previous researches. Throughout the work there are numerous references to the literature on the subject.

Text-book of embryology of man and vertebrates, O. Hertwig (*Lehrbuch der Entwicklungsgeschichte des Menschen und der Wirbeltiere. Jena, 1910, 9. ed., rev. and enl., pp. XVI+786, figs. 669*).—To this new and revised edition of a well-known work has been added an introduction of 56 pages, which gives a résumé of the history of the investigations in embryology. The main body of the work consists of 2 parts, the first part being devoted to the developing organism as a whole and the second part to the development of the individual organs of the vertebrate body. A valuable feature is the bibliography which is appended to each chapter, making a total list of about 1,500 references.

The evolution and function of living purposive matter, N. C. Macnamara (*New York, 1910, pp. XI+298, figs. 20*).—The first part of this book treats of the fundamental principles of living organisms, with special reference to the influence of heredity and environment in modifying the characteristics of succeeding generations. The second part outlines the history of a tribe of men, this being intended to demonstrate the importance of heredity.

The methods and scope of genetics, W. Bateson (*Inaug. Lecture, Univ. Cambridge, 1908, pp. 49*).—An outline of inquiries into the physiology of heredity and variation, the study now spoken of as genetics.

Some practical aspects of the science of breeding, K. J. J. Mackenzie (*Jour. Bd. Agr. [London], 17 (1910), No. 9, pp. 705-716, dgms. 6*).—The desirability of making measurements and obtaining more accurate data concerning characteristics of live stock is pointed out.

Artificial breeding, W. R. Gilbert (*Country Gent., 75 (1910), No. 3017, p. 1106*).—Among the factors pointed out as liable to induce deterioration in stock from man's interference with nature's methods, because of his desire to breed at any cost from animals which possess certain qualities or because of their pedigree, are artificial impregnation, defects accompanying parturition, and artificial selection in the attempt to produce monstrosities such as a large head on the bulldog.

Notes on heredity and evolution, W. J. Spillman (*Amer. Nat., 44 (1910), No. 528, pp. 750–762; 45 (1911), No. 529, pp. 60–64*).—A review of some recent investigations on mutation and Mendelian inheritance.

The sexual functions, H. Busquet (*La Fonction Sexuelle. Paris, 1910, pp. XIV+359, figs. 15*).—This book is a general treatise on the anatomy and physiology of the reproductive organs. A bibliography of the literature is appended.

Principles of secondary sexual characters, H. Poll (*Sitzber. Gesell. Naturf. Freunde Berlin, 1909, No. 6, pp. 331–358, figs. 4*).—The author describes the following abnormalities which came under his observation: Drake feathering in ducks, horn building in a doe, mock hermaphroditism in goats, and lateral hermaphroditism in the bullfinch. Experiments are also briefly reported on castrating drakes, castrating and transplanting ovaries and testicles in fowls, and transplantation of the feathered skin of ducks.

From these results, as well as those reported by other observers, the author concludes that sexual differences may be either gradative or alternative. In the former case the sex, as well as the secondary sexual characters, is determined by the environment during the development of the individual.

Maturation, V. Grégoire (*Cellule, 26 (1910), No. 2, pp. 223–422, figs. 145; abs. in Zentbl. Allg. u. Expt. Biol., 1 (1910), No. 15–16, pp. 555–558*).—A comprehensive and critical discussion of the results of investigation of nuclear division and the exclusion of the polar bodies in maturation of sex cells in both plants and animals. The significance of each phase in the process is considered in detail.

A bibliography is appended.

The dominance of maternal or of paternal characters in Echinoderm hybrids, D. H. Tennent (*Arch. Entwickl. Mech. Organ., 29 (1910), No. 1, pp. 1–14, figs. 2*).—The author's work on the hybridization of Echinoderms shows that the factor determining the dominance is the variation in the alkalinity of the sea water in which the embryo develops, that is, that dominance may be swung either toward the paternal or maternal side by artificial means.

Further proofs of the increase in permeability of the sea urchin's egg to electrolytes at the beginning of development, J. F. McClendon (*Science, n. ser., 32 (1910), No. 818, pp. 317, 318*).—The author recounts 3 different methods of demonstrating that electrical conductivity increases as the egg begins to develop after fertilization, namely, (1) decrease in electrical resistance, (2) less rapid disintegration of the anode region, and (3) increased plasmolysis.

On the dynamics of cell division.—II, Changes in permeability of developing eggs to electrolytes, J. F. McClendon (*Amer. Jour. Physiol., 27 (1910), No. 2, pp. 240–275, figs. 3*).—A continuation of the work noted above on artificial parthenogenesis and dynamics of cell division. A repetition of Robertson's experiments leads the author to conclude that the cleavage furrow is a region of increased surface tension, rather than of decreased surface tension, as suggested by Robertson (E. S. R., 22, p. 272) and others.

"Growth is supposed to cause division only when it affects the volume of the cytoplasm more than that of the nucleus. The ratio of the cytoplasm to the nucleus in the egg may be considered sufficient for a number of successive divisions, or the 'true' cytoplasm may grow at the expense of the yolk after each division."

Surface tension in relation to cellular process, II, A. B. MACALLUM (*Science n. ser., 32 (1910), No. 824, pp. 492–502*).—In a further discussion (E. S. R., 23, p. 377) of the forces which influence cellular metabolism the following working hypothesis is proposed: "That in the secreting or excreting cell lower surface tension exists at its secreting or excreting surface than at any point on the cell surface."

[Growth of engrafted tissues], C. C. GUTHRIE (*Science, n. ser., 30 (1909), No. 777, pp. 724, 725; Jour. Expt. Med., 12 (1910), No. 3, pp. 269–277; pls. 2; Proc. Soc. Expt. Biol. and Med., 7 (1909), No. 2, p. 43*).—A continuation of earlier work (E. S. R., 21, p. 372)

Fetuses and fragments of reproductive and other tissues of chickens and guinea pigs were engrafted in various ways. When engrafted in favorable situations both subcutaneous and intraperitoneal ovarian and testicular tissues made a good growth in chickens. The results of exchanges of such tissue between the sexes, as well as between different species, were negative. The simple method of transplanting is recommended whenever possible, but it is believed that in larger and older animals successful results will perhaps be more certain after transplantation with anastomosis of the blood vessels than after the simpler transplantation.

Heredity in connection with cancer, L. CUÉNOT and L. MERCIER (*Compt. Rend. Acad. Sci. [Paris] 150 (1910), No. 22, pp. 1443–1446; abs. in Jour. Roy. Micros. Soc. [London], 1910, No. 6, p. 705*).—The susceptibility of mice to cancer grafting was found to be inherited, though not in Mendelian fashion. "Some families show a large percentage of susceptibility, some a small percentage. The progeny of 2 cancerous parents in a 'poor line' are more likely to exhibit tumors than the progeny of 2 refractory parents in a 'rich line.'"

Contribution to the knowledge of polydactylism and syndactylism in man and domesticated animals, M. CRAMER (*Beiträge zur Kenntnis der Polydaktylie und Syndaktylie beim Menschen und einigen Haustieren. Inaug. Diss., Univ. Bern. 1910, pp. 40; Abhandl. K. Leopold. Carolin. Deut. Akad. Naturf., 93 (1910), No. 1–4, pp. 40, pls. 6; abs. in Zentbl. Allg. u. Expt. Biol., 1 (1910), No. 11–12, pp. 423, 424*).—A discussion of a large amount of data which the author has collected relating to the extra digits in man, horses, antelopes, sheep, goats, swine, dogs, cats, and poultry.

Parthenogenesis in birds, A. LÉCAILLON (*Arch. Anat. Micros., 12 (1910), No. 4, pp. 511–638, pls. 4*).—A more detailed account is given of work previously noted (E. S. R., 23, p. 571), together with additional data on the histology of the unfertilized egg of birds when fresh laid and during segmentation without fertilization, which the author considers as rudimentary, natural parthenogenesis. It is stated that adverse results, as stated by other observers, were due to poor material and faulty methods.

A bibliography is appended.

A double hen's egg, J. T. PATTERSON (*Amer. Nat., 45 (1911), No. 529, pp. 54–59, figs. 4*).—A description of an egg within an egg, evidently a product of a normal ovary and of abnormal activity in the oviduct. It is of interest as throwing light on the physiology of ovulation of birds.

Apparently the egg was carried back up the oviduct twice. The first antiperistalsis took place immediately after the hard-shelled egg was formed, and the second immediately after the inner of the two shell membrances had been laid down. The long axis of the inclosed egg formed an oblique angle with the long axis of the outer egg.

Enclosed double eggs "clearly demonstrate that when an egg has once entered the oviduct its original orientation in that organ is maintained during the formation of the envelopes, no matter to what extent it may have been moved up and down the reproductive passage."

Exhibition of hybrid animals at the Odessa exhibition (*Jour. Bd. Agr.* [*London*], *17* (*1910*), *No. 9, p. 763*).—A note on hybrids produced by mating the zebra and mare and the European bison and cow.

A pheasant-bantam hybrid, H. J. WHEELER (*Amer. Breeders Mag., 1* (*1910*), *No. 4, pp. 266–268*).—A brief account of a successful cross between a male Ring-Neck pheasant and a female mongrel bantam. The parents and offspring are described in detail.

Contribution to the knowledge of fossil and subfossil bovidæ, with special reference to the specimens in the West Prussian provincial museum at Danzig, W. LA BAUME (*Schr. Naturf. Gesell. Danzig, n. ser., 12* (*1909*), *No. 3, pp. 45–80, pls. 9; abs. in Zool. Zentbl., 17* (*1910*), *No. 11–12, p. 387*).—Descriptions are given of skulls of *Bubalus pallassii*, *Bison priscus*, *B. europæus*, *Bos primigenius*, and *B. taurus*.

The daily gain of live weight in cattle (*Mark Lane Express, 105* (*9111*), *No. 4136, p. 3, fig. 1*).—The average daily gains per head in live weight from birth of the 4 animals placed at the top of their class for the different breeds at the Smithfield Show in 1910 were as follows: Under 2 years old, Galloway, 1 lb. 13 oz.; Devon, 1 lb. 14½ oz.; Sussex, 2 lbs.; Hereford, 2 lbs. 1¼ oz.; Shorthorn, 2 lbs. 1¼ oz.; Aberdeen-Angus, 2 lbs. 2½ oz.; cross-bred, 2 lbs. 3 oz.; Red Polled, 2 lbs. 3 oz.; Welsh, 2 lbs. 4 oz.; under 3 years of age, Galloway, 1 lb. 10½ oz.; Devon, 1 lb. 11 oz.; Sussex, 1 lb. 13 oz.; Hereford, 1 lb. 13¾ oz.; Shorthorn, 1 lb. 13 oz.; Aberdeen-Angus, 1 lb. 12½ oz.; cross-bred, 1 lb. 12½ oz.; Red Polled, 1 lb. 11¾ oz.; Welsh, 1 lb. 10¾ oz.

The determination of the live weight of cattle by measuring, M. MATIEVIĆ (*Österr. Molk. Ztg., 17* (*1910*), *Nos. 19, pp. 255–257; 20, pp. 269–272; 21, pp. 286, 287; 22, pp. 297–300; 23, pp. 311–313, figs. 3*).—Several methods of determining the live weight from body measurements and deviations from the normal are discussed.

Cattle breeding in the State of Sao Paulo, O. PITSCH (*Ann. Escola Polytech. São Paulo, 10* (*1910*), *pp. 65–89*).—A general and statistical account of the cattle industry.

Austrian legislative enactments regarding cattle raising and the cattle industry (*Arch. Deut. Landw. Rats, 34* (*1910*), *pp. 231–301*).—A large amount of information is summarized regarding conditions in Austria, in several German cities, and in Denmark.

[Animal industry in Java], C. A. PENNING (*Jaarb. Dept. Landb. Nederland. Indië, 1908, pp. 257–279, pls. 16*).—A general account of the industry, but with special reference to crosses of native stock with breeds imported from Europe, India, and Australia.

Cattle in south China, G. E. ANDERSON (*Daily Cons. and Trade Rpts.* [*U. S.*], *14* (*1911*), *No. 18, p. 282*).—Notes on the cattle industry in southeastern Asia, with special reference to the exportation of cattle from Southern China to the Philippine Islands.

Tapioca for feeding calves, A. GOUIN and P. ANDOUARD (*Bul. Sta. Agron. Loire-Inf., 1908–9, pp. 69–71*).—A brief report of success in feeding calves on tapioca and milk.

[Feeding experiment with winter-fed lambs], H. H. WING (*New York Cornell Bul. 285, pp. 40–46, figs. 2*).—This reports an experiment to determine the relative cost of gain in weight with wide and narrow rations, and to study the effect of overfeeding. The experimental animals consisted of 3 pens of feeding lambs. In addition to wheat salvage and corn, which was given to all the lambs, lot 1 was given alfalfa hay, bean fodder, and oil meal; lot 2 alfalfa and ajax flakes (distillers' dried grains); and lot 3 timothy hay as a supplementary feed.

At the end of 60 days the lambs in lot 1 (nutritive ratio 1:5) had made an average gain of 16.3 lbs., at a cost of 8.27 cts. per pound gain. The corresponding figures for lot 2 (nutritive ratio 1:4.6) were 20 lbs. gain, at a cost of 7.48 cts. per pound, and for lot 3 (nutritive ratio 1:8) 15.3 lbs. at a cost of 7.87 cts. per pound.

"The rations with nutritive ratios of 1:5 and 1:4.6 gave much better results than the one with a nutritive ratio of 1:8. The experience with pen No. 3 goes to show that these sheep lacked protein in their ration. The sheep in this pen showed this, (1) by being very eager to eat up all the bean forage, and (2) by coming back up to full feed after their ration had been changed toward the end of the experiment when many lambs in pen No. 3 were eating daintily or were off feed entirely. . . . Pen No. 3 not only made poorer gains but it was hard to get the lambs to eat as much grain by weight as did the lambs in pens 1 and 2, until a change was made in the ration which narrowed the nutritive ratio."

A discussion of overfeeding as the cause of apoplexy is noted on page 588.

Report of the wool specialist, J. A. HILL (*Wyoming Sta. Rpt. 1910, pp. 65–67*).—A brief report of work in progress which consists mainly of a study of the variability in the breaking strain of wool fibers. A new experiment in studying the effect of environment on quality and quantity of wool has been undertaken. The shrinkage of wool in scouring in samples sent in from 21 firms ranged from 43.6 to 79.1 per cent.

Annual wool review (*Bul. Nat. Assoc. Wool Manfrs., 40 (1910), No. 4, pp. 301–352, pl. 1, chart 1, map 1*).—An estimate of the domestic wool clip, exports, and imports of wool in 1910. There is also a review of the wool industry, accompanied by many statistical tables concerning wool production in the United States and foreign countries.

Sheep breeding in Scotland, K. BITZER (*Fühling's Landw. Ztg., 59 (1910), No. 18, pp. 612–626, chart 1*).—A general and statistical account of the sheep industry in Scotland, with comments from a German point of view.

On the present conditions of sheep husbandry, J. NATHORST and T. HOFMAN-BANG (*K. Landtbr. Akad. Handl. och Tidskr., 49 (1910), No. 7, pp. 637–644*).—A discussion of the conditions under which sheep husbandry can be made profitable in modern Swedish agriculture.

Plan to promote sheep raising in Russia, J. H. SNODGRASS (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 12, p. 190*).—A note on the efforts of the Russian Government to encourage the sheep industry in those portions of Siberia not well adapted for other branches of agriculture.

The wild oriental sheep of Gmelin (Ovis orientalis), N. V. NASONOV (*Izv. Imp. Akad. Nauk (Bul. Acad. Imp. Sci. St. Petersb.), 6. ser., 1910, No. 9, pp. 681–710, pl. 1, figs. 12*).—A detailed description of the original cranium of a Gmelin oriental ram, as described by Pallas in 1776, and which has been in the museum of the Russian Academy of Science. Measurements of skeletons and diagrams of cross sections of the horns of modern sheep now kept in the vicinity of Ispahan are submitted to show the close relationship to *O. orientalis*.

Goat raising in Mexico, W. W. CANADA (*Daily Cons. and Trade Rpts.* [*U. S.*], *13* (*1910*), *No. 51, pp. 676–679*).—The consul at Vera Cruz reports on the present status of the goat industry in Mexico and on the opportunities offered there in this industry for the man with limited means.

The camel in the service of troops and police officers of Southwest Africa, H. BERTHOLD (*Deut. Kolon. Ztg., 27* (*1910*), *No. 49, pp. 817, 818*).—Attention is called to the superiority of the camel to horses for many purposes for the army and constabulary in Southwest Africa.

Vicuñas, llamas, and guanacos, D. DAVEL (*Bol. Min. Agr.* [*Buenos Aires*], *12* (*1910*), *No. 12, pp. 59–69, figs. 4*).—Attention is called to the valuable characteristics of the vicuña, llama, and guanaco as domesticated animals.

What the buffalo offers us, C. D. MURPHY (*Farm and Ranch, 29* (*1910*), *No. 49, pp. 3, 4, figs. 5*).—An account of the buffalo and buffalo hybrids on the Goodnight ranch in Texas.

Butchering hogs on the farm, A. W. ORR (*Missouri Bd. Agr. Mo. Bul., 8* (*1910*), *No. 9, pp. 16*).—A popular bulletin on all phases of the subject, from the selection of the type of hog to the methods of salting and curing the pork products.

China's increasing lard exports, G. E. ANDERSON (*Daily Cons. and Trade Rpts.* [*U. S.*], *14* (*1911*), *No. 11, p. 174*).—The exports of lard from China proper in 1909 were 10,411,772 lbs., valued at $642,576, or 6.17 cts. gold per pound. "These shipments of lard products from China, in connection with recent efforts to introduce Chinese pork into Europe, indicate that China's meat products are soon to be an important factor in the food situation of Pacific countries, and it is a fact of more than ordinary economic significance that the most populous country in the world is able to export food products in constantly increasing quantities."

Feeding experiments with horses, N. O. HOFMAN-BANG (*Ber. K. Vet. og Landbohöjskoles Lab. Landökonom. Forsög* [*Copenhagen*], *72* (*1910*), *pp. 67*).—These experiments were conducted on 4 Danish farms during the years 1909–10, for the purpose of determining the relative value of oats and Indian corn, of oats and mangels or ruta-bagas, and of whole and cut straw in feeding work horses of the Jutland breed. The main experimental period lasted, as a rule, from 2 to 3 months.

By substituting corn for oats 1 kg. of corn was found equal to 1 kg. of oats in the grain ration, and some straw was saved by making this change. When about 2 kg. of oats was replaced by roots in a ration of from 10 to 12 kg. of oats, 1 kg. of dry matter in the roots proved equal to 1 kg. of dry matter in the oats. Such a change in the ration did not apparently produce any injurious effects on the health or working capacity of the horses. Whole straw and cut straw were found to be of equal feeding value, weight for weight, in rations for horses at work.

The horses represented in art, R. SCHOENBECK (*Das Pferd und seine Darstellung in der Bildenden Kunst, vom Hippologischen Standpunkt aus. Leipsic, 1908, pp. X+203, pls. 45, figs. 321; rev. in Jahrb. Wiss. u. Prakt. Tierzucht, 5* (*1910*), *pp. 286, 287*).—A discussion of the color, conformation, and other characteristics of ancient and modern types of horses as represented in drawings, carvings, and pictures.

Draft horse breeding in America, E. T. ROBBINS (*Amer. Vet. Rev., 37* (*1910*), *No. 4, pp. 510–514*).—A paper read before the Illinois State Veterinary Medical Association, containing many practical suggestions on the breeding of draft horses. A common mistake that is pointed out is the failure to give draft colts sufficient feed; other serious troubles are impotence in stallions and abortion in mares.

The commercial motor truck v. the horse, H. W. PERRY (*Sci. Amer., 104 (1911), No. 2, pp. 36, 37, 50, 51, figs. 13*).—A comparison of the efficiency and cost of the two methods of motor power from actual tests.

Dogs and all about them, R. LEIGHTON (*London, New York and Toronto, 1910, pp. VIII+344, pls. 17*).—"A concise and practical handbook on matters canine." The characteristics of all the common breeds of dogs are described in detail.

Chickens, A. T. JOHNSON (*Philadelphia, 1910, pp. 159, figs. 26*).—A brief practical treatise on the breeding, feeding, and management of fowls.

Labor-saving poultry appliances, J. E. RICE and C. A. ROGERS (*New York Cornell Sta. Bul. 284, pp. 36, figs. 51*).—The labor-saving appliances illustrated and described in this bulletin are for the most part inexpensive. They include feeding and watering devices, pedigree and egg collecting appliances, catching and carrying devices, shipping packages, coops for sitting hens, fattening coops, a rack for sprouted oats, a burglar alarm system, and an improved killing and picking box.

Poultry houses and fixtures, J. E. RICE ET AL. (*Buffalo, N. Y., and Quincy, Ill., 1910, 7. ed., pp. 96, figs. 170*).—These articles by different authors contain the plans and details for constructing closed front, scratching shed, curtain front, fresh air and portable poultry houses, and appliances for the house and yard.

DAIRY FARMING—DAIRYING.

[History of dairying in the United States] (*Cream. Jour., 22 (1911), No. 2, pp. 2–55, figs. 7*).—A series of articles by numerous authors on the growth of the dairy industry in the United States during the past 60 years.

Dairying in Jamaica, C. F. PENGELLEY (*Jour. Jamaica Agr. Soc., 15 (1911), No. 1, pp. 27–29*).—A discussion of the cost of milk production in Jamaica. The amount of milk yielded annually by 25 Jamaica cows is given as 96,830 lbs. The gross receipts for milk and calves amounted to £320 5s. The cost of keeping was £95.

Cattle and dairying in the Punjab, 1910, A. M. STOW (*Lahore, 1910, pp. II+66+XII*).—A general and statistical account of the cattle, buffalo, sheep, and goat industry in the Punjab.

Dairying map of New South Wales (*Agr. Gaz. N. S. Wales, 21 (1910), No. 12, p. 1082, map 1*).—This map shows the areas suitable for specialized dairying and those for mixed farming with dairying as an adjunct.

Report on milk records for season 1909, J. HOWIE (*Ayrshire Cattle Milk Rec. Com. Rpt. 1909, pp. 313*).—This contains the yearly records of the yields of milk and percentage of fat of over 9,000 Ayrshire cows in Scotland during the season of 1909. An article by John Speir on What it Costs to Produce a Gallon of Milk is included in the report. According to his figures in 1903, in the case of 1,340 cows, the average cost per gallon was 1.14d. and in 1907 with 2,441 cows the average cost per gallon was 1.53d. The cost was less in the cheese-making districts than where market milk was produced.

Cow testing, W. M. SINGLETON (*Jour. New Zeal. Dept. Agr., 1 (1910), No. 3, pp. 149–177, figs. 10*).—The average yield of 598 cows with an average lactation period of 260 days was 7,133 lbs. of milk and 274.57 lbs. of fat. Estimates of the cost of keeping a cow in New Zealand are given.

Half a ton of butter per cow per year, H. G. VAN PELT (*Philadelphia, 1910, pp. 56, pl. 1, figs. 12*).—The methods of feeding cows which have made phenomenal records are described.

Cost of producing milk, G. M. WHITAKER (*Hoard's Dairyman, 41 (1911), No. 50, pp. 1478–1480; Pacific Dairy Rev., 14 (1911), No. 52, pp. 12–14*).—An extract of an address before the Maine Dairymen's Association, December, 1910.

It is a discussion of data obtained from different sources of the cost of milk production.

A comparison of soy-bean cake and linseed cake rations on the yield of milk and the properties of butter and cheese, J. J. Ott de Vries (*Verslag Ver. Exploit. Proefzuivelboerderij Hoorn, 1909, pp. 14–39; Molk. Ztg. Berlin, 20 (1910), Nos. 35, pp. 409, 410; 36, pp. 421, 422*).—During the main feeding period the average production of milk was 17.37 kg. and of milk fat 485.3 gm. per head and day on the soy bean ration, as contrasted with 17.07 kg. of milk and 531.4 gm. of milk fat on the linseed meal ration. The refractive index of soy bean butter was slightly lower and the percentage of volatile acids was slightly higher than that of butter made during the linseed ration period. When scored by good judges there was no appreciable difference in the quality of butter. The properties of cheese were unaffected. The soy bean ration produced no unfavorable effect on the health of the cows and in all respects was considered to be a valuable feed.

Yohimbine, J. Hasak (*Österr. Monatsschr. Tierheilk., 35 (1910), p. 97; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 52, p. 1052*).—Yohimbine administered in the form of tablets to 3 cows did not increase the milk secretion to any appreciable extent.

The absorption of drugs by milk in the mammary glands, H. B. Koldewijn (*Pharm. Weekbl., 47 (1910), Nos. 50, pp. 1305–1316; 52, pp. 1382–1394*).—A review of the investigations on this topic.

With cows' milk positive results have been found with lithium, chinin, and urotropin, and negative results with mercury, antimony, bismuth, zinc, morphin, and aspirin. With goats' milk positive results have been found with lead and alcohol, and negative results with cytisin, phenolphthalein, and fluorescein.

Composition of milk, R. Pape (*Transvaal Dept. Agr., Sci. Bul. 6, pp. 8*).—A discussion in regard to the various constituents of milk.

Investigations in regard to the increase of the fat-free dry substance in milk by creaming, C. Formenti (*Ztschr. Untersuch. Nahr. u. Genussmtl., 19 (1910), No. 11, pp. 616–625; abs. in Chem. Ztg., 34 (1910), No. 99, Repert., p. 406*).—By extensive tests the author determined that on creaming milk, irrespective of whether it was done in a flat or high vessel or a cylinder with a glass stopcock at its base, or whether the cream was allowed to rise itself or separated with a centrifuge, an increase in the fat-free dry substance of the residual milk took place. It was also found that water could be added to such milk up to 10 per cent of its bulk without reducing the fat-free dry substance below the normal content of the whole milk.

The influence of various amounts of rennet and various temperatures upon the coagulation of milk and the microscopic structure of the casein and fibrin coagulum, R. Bräuler (*Pflüger's Arch. Physiol., 133 (1910), No. 11–12, pp. 519–551, figs. 3*).—When all influencing factors are eliminated the rate of coagulation proceeds in proportion to the amount of ferment present—the greater the quantity of ferment the quicker the coagulation. The work further shows that an inverse ratio exists between these amounts—when double the amount of ferment is utilized the coagulation requires but half the usual time.

In studying the influence of temperature upon the coagulation, the author found with small amounts of ferment that temperatures up to about 39° C. accelerate the coagulation. Where larger amounts of ferment are used still higher temperatures can be withstood, but the limit of temperature for activity was found to be 50°. From this it can be inferred that each quantity of ferment has an optimum temperature.

As a result of noting the macroscopic and microscopic appearances of the coagulum obtained from milk, the author was able to differentiate between a coagulum which was obtained with an acid and that which was produced by rennet. On comparing the microscopic picture of the coagulum obtained from milk and that obtained from blood it was seen that a close relation seems to exist as to the nature of the two processes, and, further, that the more rapid the rate of coagulation the denser the preparation will be.

A note on an organism producing a burnt milk taste, W. SADLER (*Centbl. Bakt.* [etc.], *2. Abt., 29* (*1911*), *No. 1–3, pp. 1–3, fig. 1*).—A facultative anaerobe of the general type of Leichmann's *Bacterium lactici acidi* was found to coagulate milk, producing a flavor and odor resembling burnt milk and rendering the milk unpalatable. The effect on the butter and cheese made from such milk was very marked.

The bacillus of long life, L. M. DOUGLAS (*London and Edinburgh, 1911, pp. VII+165, pls. 58, figs. 9*).—This book is designed to meet the demand for information on the bacteriology of sour milk, its preparation, and its value in therapeutics.

The practical value of bacterial examinations of milk and cream, J. O. JORDAN (*Ice Cream Trade Jour., 6* (*1910*), *No. 12, pp. 51–55, dgms. 2*).—A lecture before the National Association of Ice Cream Manufacturers, November, 1910. The author shows how the bacterial count of the milk supply in Boston has been reduced since a systematic examination of milk and a temperature regulation of 50° F. have been enforced.

The microscope in the dairy, J. SCOTT (*Mark Lane Express, 105* (*1911*), *Nos. 4137, p. 27; 4138, p. 55; 4139, pp. 95, 97, figs. 9*).—Attention is called to the value of the microscope for even the elementary study of milk and its properties. It is pointed out that all persons interested in dairying should have some first hand knowledge of fat globules, casein curds, crystals, the various insoluble materials, bacteria, and other micro-organisms found in milk.

Clean milk: Essential requirements from production to consumption, C. H. YATES and R. E. BRAND (*Illinois Sta. Circ. 147, pp. 36, figs. 7*).—Some of the important requirements for the proper care and handling of milk are presented in popular form for producers, consumers, and inspectors of milk. Cooling and bottling milk, the construction of stables and milk rooms, economy of production, and related topics are briefly discussed. Formulas for preparing whitewash and disinfectants, forms of score cards for scoring milk, milk depots and dairy farms, and milk statutes are given.

The modern milk pail, H. A. HARDING, J. K. WILSON, and G. A. SMITH (*New York State Sta. Bul. 326, pp. 249–281, pls. 4*).—This bulletin reports the results of a bacteriological study, comprising comparative tests of a number of improved milk pails found upon the market, and suggests a form which can be easily and cheaply made by any tinsmith and which combines the good points of the best pails.

Preliminary to the test a study was made of the proper amount of dilution of milk samples for the most satisfactory results. In this it was found that the dilution which showed the highest germ content was not always the most accurate, and that a satisfactory dilution for these tests would be somewhat less than 1:100.

The reduction of the germ content by using the improved pails, as contrasted with ordinary 12-in. pails, ranged from 48.4 to 70.1 per cent. All of these types were satisfactory from a sanitary standpoint but some were too high or were otherwise inconvenient to use.

"More than one-half of the infection that milk receives during the milking process can be prevented by the use of a covered pail."

"For short-legged or heavy-uddered cows the pails should not be more than 12 in. high over all. An elliptical opening is preferable to a round one covering the same number of square inches since it is easier to milk into it. . . . The cover should be sufficiently convex so that the entire inside of the pail can be seen and easily reached for cleaning. It should be made flush with the very top of the pail so as to avoid a groove which will conduct material from the top of the pail around to the opening and into the milk.

"A suitable cover soldered to an ordinary milk pail by a local tinsmith will give satisfaction if the work is well done and all of the seams are carefully filled with solder. Such a cover can be placed upon an ordinary milk pail by any tinsmith at very little expense."

Covered pails mean cleaner milk, F. H. HALL (*New York State Sta. Bul. 326, popular ed., pp. 6*).—A popular edition of the above.

Milk legislation (*Jour. Amer. Med. Assoc., 56 (1911), No. 5, pp. 350–352*).—A discussion of state *v.* city control of legislation in regard to the inspection of dairies, the tuberculin test, and pasteurization.

"The value of the tuberculin test is accepted by men who are competent to express an opinion. Pasteurization of milk is also of undoubted value in the absence of the compulsory tuberculin test. The cattle-owner does not realize that not only is the presence of tuberculosis in his herd a menace to public health, but his herd can not be as profitable as a healthy herd, and that, moreover, one tuberculous cow will spread disease rapidly to healthy cows. The production of clean milk is wholly a scientific and not a political or commercial question, and the mere idea that the lives of innocent babies should depend on political or commercial considerations is a monstrous one."

Further observations of the milk supply of Washington, D. C., G. L. MAGRUDER (*Jour. Amer. Med. Assoc., 55 (1910), No. 7, pp. 581–589, charts 3*).—A history of the efforts of the United States Government and of the health officials of the District of Columbia in the improvement of the milk supply of Washington.

Certified milk in New York State (*N. Y. Dept. Agr. Bul. 18, pp. 88c, pl. 1, figs. 29*).—This contains information concerning milk commissions, and answers to a circular letter sent to producers of certified milk, concerning methods of caring for stock and management of milk, are given.

The cream supply, H. A. HOPPER (*California Sta. Bul. 209, pp. 115–137, figs. 13*).—A bulletin of popular information. Among topics discussed are sources of bacteria, milking machines, sanitary milk pails, cream separators, causes of variation in the cream test, and management of the cream.

Notice of judgment (*U. S. Dept. Agr., Notice of Judgment 713, pp. 2*).—This relates to the misbranding of butter.

Modern butter making and dairy arithmetic, M. H. MEYER (*Madison, Wis., 1910, pp. 306, figs. 10*).—A practical treatise on butter making, based largely on the results of the author's 25 years' experience on a dairy farm, in creamery butter making, and as instructor in dairying.

A visit to the Rütti-Zollikofen Dairy School, E. H. FARRINGTON (*Proc. South. Wis. Cheesemakers' and Dairymen's Assoc., 10 (1910), pp. 54–62*).—The methods of making cheese and whey butter, as practiced at this school, are described.

Theory and practice of cheese making, P. MAZÉ (*Technique Fromagère. Paris, 1910, pp. 85; Ann. Inst. Pasteur, 24 (1910), Nos. 5, pp. 395–427; 6, pp. 435–466, pls. 2, figs. 14; 7, pp. 543–562; Indus. Lait* [*Paris*], *35 (1910), Nos. 36, pp. 583–591; 38, pp. 618–625; 39, pp. 635–640; 40, pp. 650–655; 41, pp. 668–670; 42, pp. 685, 686; 43, pp. 702–704; 44, pp. 716–719; 46, pp. 745–747; 47, pp. 762–767; 48, pp. 779–784; 49, pp. 798, 799; 51. pp. 829–831; 52, pp. 841–843; 36 (1911), Nos. 1, pp. 8–10; 2, pp. 24–26; 3, pp. 35–42; 4, pp. 54–61; rev. in Rev. Gén. Sci., 21 (1910), No. 22, p. 957*).—A discussion of the results of scientific investigations as applied to the practice of making cheeses of the Brie and Camembert types.

The influences of temperature, acidity, ferments, and other factors on the resulting product are considered in detail. The ferments are classified according to their influence on the curd, as follows: (1) The lactic-acid ferments which act on the milk sugar; (2) the molds or combustion ferments which destroy milk sugar and lactic acid and arrest the activity of the lactic ferment; and (3) the alkaline ferments which destroy the remaining sugar and also attack the lower nitrogenous compounds. The most important ferments for the cheese maker are those which will destroy milk sugar but leave the nitrogenous products intact. The defects of cheese by the development of undesirable organisms, or by the too luxuriant growth of the desirable ones, are discussed at length; also the influence of the quality of milk and the importance of pasteurization.

Fancy cheese in America, C. A. PUBLOW (*Chicago, 1910, pp. 96, pls. 3, figs. 13*).—This book describes the process of the manufacture of casein and the following varieties of cheese: Cream, club, cottage, Neufchatel, Ricotto, Port du Salut, Pont l'Eveque, brick, Brie, Camembert, Oka, Isigny, Limburg, Munster, Caciocavallo, Stilton, Gorgonzola, Roquefort, pineapple, Edam, Gouda, Swiss, Cheddar, skim-milk Cheddar, buttermilk, washed-curd Cheddar, stirred curd, goat's milk, caraway-potato, sandwich-nut, olive-cream, and pimento.

VETERINARY MEDICINE.

Biology, general and medical, J. McFARLAND (*Philadelphia and London, 1910, pp. 440, pls. 5, figs. 147*).—This work takes up the subject under the following headings: Cosmic relations of living matter, origin of life, criteria of life, manifestations of life, the cell, cell division, higher organisms, reproduction, ontogenesis, conformity to type, divergence, structural relationship, blood relationship, parasitism, infection and immunity, mutilation and regeneration, grafting and senescence, decadence, and death.

Lectures in regard to infection and immunity, P. T. MÜLLER, (*Vorlesungen über Infektion und Immunität. Jena, 1910, 3. ed., rev. and enl., pp. XI+451, figs. 23*).—The various chapters in this work treat of the following subjects: Sources of infection; the bacterial poisons; distribution and localization of the poisons in the body; incubation period and virulence; behavior of micro-organisms in the infected animal body; phagocytosis; the bactericidal and globulicidal activities of the body fluids; the bactericidal and globulicidal activities of serum; the opsonins; active immunization and its results—the antibodies; antibodies, II; nature and the quantitative relation of the binding of antigens and antibodies, I; quantitative relation of the binding between toxin and antitoxin (II—Ehrlich's toxin analysis; lysins and antilysins); agglutinins and precipitins; Ehrlich's side-chain theory; varieties of side-chain theories; varieties of antitoxic immunity; anaphylaxis; the kinds of antibacterial immunities—diminution of resistance; treatment of infectious diseases; the practical results of protective vaccination and serum therapy; the use of the immunity reactions for diagnostic purposes; and the application of immunity to certain problems of physiology, pathology, and general biology.

General register for Zeitschrift für Immunitätsforschung und experimentelle Therapie, E. FRIEDBERGER and E. UNGERMANN (*Zeitschrift für Immunitätsforschung und experimentelle Therapie. Register über die Literatur des Jahres 1909. Jena, 1910, pp. III+152*).—This is the general author and subject index for the year 1909.

In regard to the toxicity of heterologous sera and critera of anaphylaxis, A. BIEDL and R. KRAUS (*Ztschr. Immunitätsf. u. Expt. Ther., I,* *Orig.*, 7 (*1910*), *No. 4*, *pp. 408–413*).—The results show that neither the toxins of fresh bovine, human, or rabbit-sheep serum, nor anaphylaxytoxin produce typical anaphylaxis. These substances were not capable of producing a broncho-spasm, but on the contrary brought about an edema of the lung instead. The toxicity of these sera is probably due to an alteration of the coagulation function of the blood, and eventually results in the clumping of the erythrocytes, with thrombus formation in the alveoli of the lung tissue.

The antitryptic, isolytic, and heterolytic power of the blood serum in different pathological conditions, G. Finzi (*Rec. Méd. Vét.*, *87* (*1910*), *No. 15*, *pp. 515–525*).—A study of the antitryptic, isolytic, and heterolytic power of the blood serum from animals infected with the tubercle bacillus (cattle), the Preisz-Nocard bacillus (sheep), and others having chronic enteritis (cattle), and from cachectic animals (cattle).

The results show that with tubercular bovines the antitryptic power of the serum is generally less than that of the normal serum. This is not the case with man. In the case of the Preisz-Nocard infection and chronic enteritis, the index is also lowered. In cachectic animals the index is increased, but this is not directly due to the cachexia present. The hemolytic (heterolytic and isolytic) power was of no clinical value.

Immunizing agents and therapeutic sera in veterinary medical practice, W. H. Dalrymple (*Amer. Vet. Rev.*, *38* (*1911*), *No. 4*, *pp. 511–517*).—A general discussion of the subject.

About a method of drying serum, S. Fränkel and A. Elfer (*Biochem. Ztschr.*, *28* (*1910*), *No. 3–4*, *pp. 330, 331*).—The method is described in detail.

The part played by chemical synthesis in the development of chemotherapy (*Österr. Chem. Ztg.*, *13* (*1910*), *No. 21*, *pp. 263–265*).—A review of the existing chemical patent literature, with particular reference to the development of chemotherapy.

Ehrlich's chemotherapy—a new science, H. Schweitzer (*Science*, *n. ser.*, *32* (*1910*), *No. 832*, *pp. 809–823*).—After briefly discussing the various tropical diseases of man and animals, particularly those caused by protozoa and their treatment with coal-tar products, the author with the aid of structural formulas points out the chemistry of the various products used for the above diseases, especially No. 606 for the treatment of lues.

A description of the Ehrlich-Hata preparation 606 (*Ztschr. Riech u. Geschmackst.*, *2* (*1910*), *No. 24*, *pp. 267–269*; *Deut. Med. Wchnschr.*, *36* (*1910*), *No. 37*, *pp. 1693, 1694*).—This is the patent specification of Ehrlich-Hata preparation 606, which is entitled Methods for Preparing the Amido Derivatives of Oxyarylarsic Acid and their Reduction Products. The preparation is chemically dioxydiamidoarsenobenzol.

About an endotoxin of the Micrococcus melitensis, P. N. Bernard (*Compt. Rend. Soc. Biol.* [*Paris*], *69* (*1910*), *No. 24*, *pp. 36–38*; *abs. in Ztschr. Immunitätsf. u. Expt. Ther.*, *II*, *Ref.*, *3* (*1910*), *No. 3*, *p. 609*).—The author was able to produce a toxin in cultures of *M. melitensis* which possessed a strong affinity for nerve cells. Intracerebrally it was lethal in from 6 to 9 hours and intraperitoneally in from 13 to 36 hours. The toxins resisted heat up to 58° C., but at 80° became somewhat weakened. Intracerebrally one one-thousandth part of the dose which is necessary intraperitoneally is fatal.

The precipitin reaction in erysipelas, A. Vanney (*Compt. Rend. Soc. Biol.* [*Paris*], *69* (*1910*), *No. 26*, *pp. 138, 139*; *abs. in Ztschr. Immunitätsf. u. Expt. Ther.*, *II*, *Ref.*, *3* (*1910*), *No. 3*, *p. 614*).—The author was able with filtrates from the erysipelas bacterium and the corresponding immune serum to obtain a precipitation such as Vallée obtained with the serum from horses immunized against tuberculosis and tuberculin. The reaction is most definite at 37° C. and where filtrates from cultures which have been heated to 70° before filtering are employed.

Contagiousness of Malta fever (*Jour. Amer. Med. Assoc., 55 (1910), No. 24, p. 2074*).—The value is pointed out of using cultures killed with formaldehyde vapors in laboratories where the agglutination test for Malta fever is carried out. As this disease has increased in France, it is recommended that milk obtained from goats be boiled and, further, that the importation of goats from Malta be prohibited.

"Muhinyo," a disease of natives in Uganda, D. BRUCE ET AL. (*Proc. Roy. Soc. [London], Ser. B, 82 (1910), No. B 558, pp. 485–490, fig. 1*).—The authors conclude that "muhinyo" is Malta fever and that it is conveyed from goat to man by the drinking of goats' milk.

Combating tetanus in animals with specific tetanus antitoxin, H. HOLTERBACH (*Deut. Tierärztl. Wchnschr., 18 (1910), Nos. 31, pp. 457–460; 32, pp. 469–475; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 1, p. 539*).—The unfavorable results obtained from tetanus antitoxin by some veterinarians are probably due to employing too small amounts of the serum. The curative dose per kilogram of body weight is one antitoxin unit. This dose may be repeated as often as necessary. Prophylactically, from 100 to 200 units are necessary at one injection.

Experiments to ascertain if cattle may act as a reservoir of the virus of sleeping sickness (Trypanosoma gambiense), D. BRUCE ET AL. (*Proc. Roy. Soc. [London], Ser. B, 82 (1910), No. B 558, pp. 480–484*).—"It has been proved by experiment that cattle may act as a reservoir of the virus of sleeping sickness, and that healthy animals may be infected from them by means of *Glossina palpalis*. It has also been proved that cattle in the fly area do naturally harbor *T. gambiense*. It is, therefore, possible that the cattle and antelope living in the fly area may act as a reservoir and so keep up the infectivity of the *G. palpalis* for an indefinite period, but there is no proof up to the present that this actually takes place in nature."

Trypanosome diseases of domestic animals in Uganda, I–III, D. BRUCE ET AL. (*Proc. Roy. Soc. [London], Ser. B, 82 (1910), No. B 558, pp. 468–479, pls. 2; Ser. B, 83 (1910), No. B 561, pp. 1–27, pls. 5, figs. 2*).—The first paper deals with *Trypanosoma pecorum*, the second with *T. brucci*, and the third with *T. vivax*.

The conclusions drawn are that "*T. pecorum* is an important trypanosome disease of domestic animals in Uganda. It is similar in morphology, action on animals, and cultural characters, to the *T. dimorphon* described by Laveran and Mesnil, and to Edington's trypanosome from Zanzibar [E. S. R., 21, p. 581] except that *T. pecorum* is not pathogenic to guinea pigs. The carrier is unknown, but is probably a Tabanus, and not Stomoxys."

"The commission consider themselves justified in considering the trypanosome recovered from the Uganda ox to be identical with *T. brucei*, the cause of nagana in Zululand and other parts of South Africa. . . . *T. vivax*, an easily recognizable species, gives rise to a fatal disease of cattle in Uganda. The carrier of *T. vivax* is probably *Glossina palpalis*, which is found naturally infected on the lake shore. The reservoir of the virus is possibly the antelope which frequent the *G. palpalis* area."

Contribution to experimental tuberculosis in sea fishes with studies in regard to the transmutation of tubercle bacillus of warm-blooded animals, L. VON BETEGH (*Centbl. Bakt. [etc.], 1. Abt., Orig., 54 (1910), No. 3, pp. 211–216; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 4 (1910), No. 12, p. 633*).—Some of the eels utilized in the experiments were inoculated intramuscularly, and others intraperitoneally, with bacilli from man, cattle, birds, and fresh-water fish. Only the last named was infectious. It produced a local lesion, but could not be propagated any further. From this the author concludes that transmutation is not possible.

The conversion of the human type of tubercle bacillus into the bovine type, A. EBER (*München. Med. Wchnschr., 57 (1910), No. 3, pp. 115–120; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 4 (1910), No 12, p. 635*).—Cattle infected with the human type of bacillus eventually yielded bacteria resembling the bovine type in virulence.

The absence of living tubercle bacilli from some old tuberculous lesions in man, L. COBBETT (*Proc. Cambridge Phil. Soc., 15 (1910), No. 6, pp. 536–539*).—The author reports his findings and shows that in 5 out of 7 cases which were undoubtedly tubercular the tubercles on injection into animals produced no lesions.

Transference of tuberculin hypersensitiveness, M. ONAKA (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 7 (1910), No. 4, pp. 507–514*).—If normal healthy guinea pigs are treated with the tissues from a tubercular guinea pig or antiformin extracts of the tubercle bacillus, tuberculin hypersensitiveness is conveyed to the animal. A reduction in complement is noted in most cases of passive hypersensitiveness but not in active cases.

Investigation in regard to the significance of the tuberculin titer for diagnosis, A. ERLANDSEN and O. V. C. E. PETERSEN (*Hospitalstid. [Copenhagen], 53 (1910), Nos. 24, pp. 657–676; 25, pp. 681–695; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 4 (1910), No. 12, p. 629*).—The cutaneous reaction is preferred by the authors, owing to the fact that a certain amount of sensibilization takes place with the subcutaneous reaction.

The tuberculin titer (the greatest dilution which reacts with the individual) has a certain relation to the degree of severity of the tuberculous process, being zero in subjects free from tuberculosis, low in latent cases, high in new and slight cases, and low with severe cases. A high tuberculin titer (from 200 to 400) points to the possible existence of an active process, but in this connection there must be considered subjects having either previously infected but healed glands or bone tuberculosis, as these also have a high titer over a long period of time.

In regard to the inconstancy of the diazo reaction in the urine of the tuberculous, M. WEISS (*Med. Klinik, 6 (1910), No. 22, p. 867; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 4 (1910), No. 12, p. 632*).—The inconstancy of this reaction is due to the presence of a pro-body which is evidently of a peptone or poly-peptid nature and which can be converted into the reacting substance by placing the urine in a thermostat for 24 hours at blood heat.

This finding will probably help promote the prognostic value of the diazo reaction, particularly in marked cases of tuberculosis.

Report on the combating of bovine tuberculosis in Sweden up to 1909, G. REGNÉR (*Meddel K. Landtbr. Styr. [Sweden], 1910, No. 2 (149), pp. 80*).—The results of the work against bovine tuberculosis under government direction up to the year 1909 are given in detail and summarized.

The methods of combating the disease have been both offensive (eradicating tuberculosis from diseased herds) and defensive (preventing its introduction into healthy herds). In the initial tuberculin tests with 1,370 dairy herds, consisting of 49,112 animals, 14,175 reacted, and up to 1909, 57,734 animals had been found within the same herds, of which 1,761 or 3.1 per cent reacted on second test. It is pointed out, however, that this result alone does not represent the entire value of the tuberculin testing, inasmuch as the progress in dairy-barn and milk sanitation during the last 15 years has doubtless come, according to the author, mainly as a result of the campaign against tuberculosis.

Data relating to the tuberculin tests conducted in Sweden since 1897, with annual summaries, are presented in the appendix. The total number of animals tested from 1897 to 1908, inclusive, was 716,310, of which 12,728 herds with 306,372 animals were tested for the first time; of the latter number 29.8 per cent reacted, while 5,527 of the herds were found entirely free from tuberculosis.

Vaccinating against hemoglobinuria in bovines, SCHULTZE (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 43, p. 829*).—A reply to Schmitt (E. S. R., 23, p. 788).

The cause of "apoplexy" in winter-fed lambs, H. H. WING (*New York Cornell Sta. Bul. 285, pp. 37–46, figs. 3*).—For several years a disease resembling apoplexy in man has affected lambs being fed in the vicinity of Batavia, N. Y., for the spring market. "In some cases the losses have amounted to a large percentage of the flock. The trouble appears suddenly and does its work quickly. It is sometimes accompanied by paralysis. It nearly always proves fatal, only about 1 or 2 per cent of those afflicted ever having been known to recover. The disease seems to occur only where lambs are being fed heavily and it then attacks the strongest and most vigorous. Lambs will be feeding nicely and all will seem perfectly well at 12 o'clock m., and when the feeder returns at 4 or 5 p. m., 1 or 2 of the best lambs will be found dead, appearing to have died without a struggle."

Two opinions have been set forward as to its cause—first, that the disease is brought about by feeding an excess of protein in the ration and second, that the disease is caused by overfeeding. An experiment to determine its cause was combined with a feeding experiment as noted on page 578. The results as relating to the cause of the disease and the conclusions drawn are as follows:

"From the observations during this experiment, it would seem that apoplexy is caused mainly by sudden overfeeding rather than from feeding a narrow ration. Three lambs were lost from pen No. 3, which were fed a ration with a nutritive ratio of 1:8, while one lamb was lost from pen No. 2 with a ration having a nutritive ratio of 1:4.6, and no lambs were lost in pen No. 1 in which the nutritive ratio of the ration was 1:5. Furthermore, no lambs were lost from any pen when it was full except that in pen No. 3, fed a ration having a nutritive ratio of 1:8, one lamb was lost when some of the lambs were off feed, thus allowing others to overfeed. In the opinion of the persons who conducted this experiment, there should not be the wholesale loss from overfeeding that some feeders have experienced if proper precautions are taken to keep the rack spaces all occupied and to distribute the grain equally. There may be an occasional sheep that can not stand the heavy feeding necessary for fattening, and there may also be an occasional loss from nervous excitement, which is thought to be one cause of apoplexy."

Linguatulosis fatal to the goat, MOUSSU (*Rec. Méd. Vét., 87 (1910), No. 5, pp. 153–158; abs. in Vet. Rec., 23 (1910), No. 1169, pp. 356, 357*).—The case reported was parasitized by *Linguatula tænioides* and stomach worms.

Sarcocysts in the camel in Egypt, F. E. MASON (*Jour. Compar. Path. and Ther., 23 (1910), No. 2, pp. 168–176, figs. 7*).—The author shows that the sarcocyst of the camel differs in many ways from the sarcocysts of the ox, buffalo, sheep, and pig. He considers it to represent a new species, and supplies the name *Sarcocystis cameli*.

"Attempts at discovery of the source of infection have failed; examinations of ticks, biting flies, and lice in the case of the buffalo, have not given any satisfactory result. No calcified cysts have been found, nor any evidence of encapsulation; and apparently there is no marked inflammatory reaction as long as the cyst remains intact."

Krafft's vaccination against swine plague, von Lojewski (*Berlin. Tierärztl. Wehnschr., 26 (1910), No. 43, pp. 829, 830*).—The results obtained with 619 pigs were considered good.

Bacteria resembling paratyphoid B in the intestinal tract of the horse, E. Huber (*Centbl. Bakt. [etc.], 1. Abt., Orig., 56 (1910), No. 1, pp. 1–28*).—The bacteria from the intestinal tracts of 100 horses which came to slaughter were examined and compared with 15 strains of paratyphoid B (human and calf) cultures, 5 of *Bacillus suipestifer*, 1 of mouse typhoid, and 1 of *B. enteritidis* Gärtner.

The author concludes from his work that strains 2, 21, 23, and 34 isolated from the intestinal tract of the horse, and which are agglutinable by paratyphoid B and hog-cholera serum, as well as a nonmotile strain, differ from the bacteria of the hog cholera in the following respects: (1) Glycerin is decomposed by the horse strain (with the exception of a nonmotile one) with a rapid evolution of acid and gas, whereas paratyphoid B and *B. suipestifer* decompose glycerin but produce only a small amount of gas; (2) the horse strains reduce malachit green and orcein to a less extent than paratyphoid B and *B. suipestifer;* (3) less hydrogen sulphid is liberated by the horse strains; (4) no proteinochrom is produced by the horse strains; (5) indol is produced by the horse strains but not by *B. suipestifer* and paratyphoid B; (6) the horse strains are only slightly agglutinated and never to the limit of the titer. Normal horse sera agglutinate them much more strongly than do the paratyphoid and *B. suipestifer* strains.

The bacteria from the hog-cholera group were only slight affected by sera which were prepared from horse strains. The horse strains were therefore characteristic of a distinct race, which on one hand partly resembles the *B. coli communis* and on the other the paratyphoid B.

Vaccination against equine influenza, Pommerich (*Berlin. Tierärztl. Wehnschr., 26 (1910), No. 42, pp. 811, 812*).—The results obtained, noted after 8 months, were excellent.

The diagnosis of rabies, J. Reichel (*Amer. Vet. Rev., 38 (1911), No. 4, pp. 447–472, figs. 4*).—The author, in addition to discussing the historical, pathological, and clinical data, the rules regulating the examination and diagnosis of rabies, and the laboratory procedure for detecting it, points out that more heads were received in the laboratory for diagnosis during November and December than during the months of July and August—this finding being contrary to general opinion—and further, that no clinical case of rabies (with symptoms) which he had under observation lived over 8 days.

From the results of a microscopic examination of sections of the medulla oblongata and ganglia, including one of the sympathetic ganglia and the plexiform ganglion of the pneumogastric nerves, it was found that Babes' rabid tubercle" was not noted in the medulla oblongata of 27.5 per cent of rabid animals. On the other hand, it was present in 5.8 per cent of the cases in nonrabid animals. The proliferation changes of Van Gehuchten and Nelis in the sympathetic ganglia were present in 77.6 per cent of the authentic cases and in 4.2 per cent of the cases free of rabies. Of the rabid cases in the plexiform ganglion 99.1 per cent were positive, and of the nonrabid cases, 12.9 per cent.

Examinations for the presence of Negri bodies resulted in 9.6 per cent of failures in positive cases. The greatest difficulty in detecting the bodies was experienced with the horse.

Fowl cholera and methods of combating it, P. B. Hadley (*Rhode Island Sta. Bul. 144, pp. 309–337, dgms. 3*).—This summarized account of the disease of poultry, caused by *Bacillus bipolaris septicus* and known as fowl cholera, includes a brief report of 2 experiments involving the inoculation of the bacillus and the subcutaneous injection of carbolic acid. It is shown that while the disease has been known in Europe for more than a century it was not recognized in the United States until about 1875, since which time it has become common in many parts of the country and is increasing in prevalence in New England. The rapid spread of the disease that may take place when it once breaks out in a flock is shown by a diagram illustrating its occurrence in the case of a Massachusetts epidemic.

In the first of 2 preliminary inoculation experiments reported eight 10-months old fowls were employed; 4 were held as checks and 4 were subcutaneously inoculated on March 29 with 5 cc. of a 96-hour bouillon culture of the bacillus. Twenty-three hours later 2 of the checks and 1 of the inoculated fowls were subcutaneously injected with 2 cc. and 1 of the inoculated fowls with 3 cc. of a 5 per cent solution of carbolic acid. The result was that the 2 inoculated fowls into which carbolic acid had not been injected died, 1 on April 11 and the other on April 17, while the other 6 remained healthy.

In the second experiment 2 of the 6 fowls used were held as checks, while on April 13 5 cc. of a 96-hour bouillon culture was put into the crops of the other 4 by means of long, sterile glass pipettes. Two of the infected fowls were injected with a 5 per cent solution of carbolic acid. 1 being given 3 cc. 20 hours after being inoculated, while the other, commencing in 1 hour after the inoculation, received daily injections of 3 cc. for 6 days followed by daily injections of 4 cc. for 7 days. As a result 1 of the inoculated, untreated fowls succumbed to the disease on April 18; the other became very sick on April 19 but recovered, while the 2 check fowls and the 2 treated with carbolic acid remained healthy. The temperatures of the fowls used in the 2 experiments are shown in diagrammatic form.

Attention is called to the fact that while 46 cc. of a 5 per cent carbolic acid solution was injected into a fowl within 13 days, so far as could be ascertained its health was not impaired and the only pathological condition brought about in the injected fowls was a slight greening and drying of the skin at the site of introduction of the carbolic acid. It is stated that experiments conducted at the Rhode Island Station show the fowl-cholera bacillus to be destroyed by 1 per cent solution of carbolic acid in 15 minutes but not by a 0.9 per cent solution and that a 0.5 per cent solution kills the organism in 4 hours. The clinical features by which the disease may be recognized by poultrymen and directions for dealing with it follow. The author strongly advises against keeping a large number of fowls together in a single flock unless there be at hand some immediate means for dividing the yards if cholera or any other similar infectious disease appears.

Amœba meleagridis, T. SMITH (*Science, n. ser., 32 (1910), No. 824, pp. 509–512*).—This is a polemical article with reference to that of Cole, Hadley, and Kirkpatrick (E. S. R., 24, p. 187) in which the author presents evidence to show why *A. meleagridis* and *Coccidium tenellum* should not be regarded as identical. He states that there is "ample evidence to show that enterohepatitis may run its course in a flock without the presence of a single coccidium cyst to suggest coccidiosis. It is evident that coccidiosis among birds has been frequently seen during the past 30 years, but without involvement of the liver."

Amœba meleagridis, L. J. COLE and P. B. HADLEY (*Science, n. ser., 32 (1910), No. 834, pp. 918, 919*).—A reply to the above.

Paralysis in the ostrich, W. ROBERTSON (*Jour. Compar. Path. and Ther., 23 (1910), No. 2, pp. 182–189, figs. 4*).—The author finds the causal organism of this affection to be a short rod, fairly regular in shape, that stains with the ordinary anilin dyes but not by Gram's method. He is convinced that contaminated food and water is the common if not the only source of infection.

Notes on life history of the ostrich wireworm (Strongylus douglassii), W. ROBERTSON (*Agr. Jour. Cape Good Hope, 37 (1910), No. 2, pp. 139–149, figs. 7*).—The author finds the incubation period of the eggs of *S. douglassii* to be between 17 and 20 days.

RURAL ECONOMICS.

The International Institute of Agriculture and its first labors, R. D. VOLTA (*Atti R. Accad. Econ. Agr. Georg. Firenze, 5. ser., 7 (1910), No. 3, pp. 177–194*).—This article discusses the origin, purpose, and work of the institute, the nature and scope of its publications, and the prospective value of its work in promoting the economic and social improvement of agriculture throughout the world.

Copy of further papers relative to the International Agricultural Institute, T. H. ELLIOTT ET AL. (*London, Govt., 1910, pp. 111*).—This contains a report by the secretary to the Board of Agriculture and Fisheries of Great Britain on the proceedings of the general assembly held at Rome in December, 1909, a list of delegates to the assembly, and 17 appendixes which consist of reports by delegates as to the organization and work of the institute.

[Agricultural organizations and the cooperative movement], G. LORENZONI ET AL. (*Internat. Inst. Agr. [Rome], Bul. Bur. Econ. and Soc. Intel., 1 (1910), No. 1, pp. XXIV+430*).—This volume contains a history of the agricultural cooperative movement, complete statistical returns on agricultural cooperation, insurance, credit, and legislation in Germany, Austria, and Italy, and partial details for Denmark, United States, Great Britain, Ireland, and Japan, together with bibliographies of the sources of information.

State assistance to agriculture in Denmark, TURNER (*Jour. Bd. Agr. [London], 17 (1910), No. 7, pp. 566–572*).—The sum allotted to the minister of agriculture by the Danish budget for 1910 was $1,366,700. A law of April 30, 1909, also places at the disposal of the government each year for five years the sum of $1,072,000 for the purpose of assisting peasants to acquire small holdings. The methods of securing assistance and the different organizations and lines of work receiving aid are described.

The general basis and auxiliary resources of agriculture in Germany, F. BORNEMANN (*Mitt. Deut. Landw. Gesell., 25 (1910), No. 40, pp. 582–585; Ann. Gembloux, 20 (1910), No. 11, pp. 608–620*).—This article, which was read at one of the meetings held during the Brussels Exposition in 1910, sets forth by means of statistics and discussion the physiographical, commercial, economic, and social conditions affecting agriculture in Germany.

The data include the land areas, the climatic regions of the empire, the number and size of holdings, the number and classification of the agricultural population, the number and kinds of agricultural machinery and implements employed, the quantity and value of fertilizers used, and the number and kind of plant and live stock breeders. The following table shows the increase in the number of small holdings:

Number and size of agricultural holdings in Germany.

Size.	1882.	1895.	1907.
Under 2 hectares	3,061,831	3,236,367	3,378,509
2–5 hectares	981,407	1,016,318	1,006,277
5–20 hectares	926,605	998,804	1,065,539
20–100 hectares	281,510	281,767	262,191
100 hectares and over	24,991	25,061	23,566
Total	5,276,344	5,558,317	5,736,082

The agricultural population numbered 18,704,038 in 1882, 17,815,187 in 1895, and 16,920,671 in 1907, and the agricultural laborers in these same years 6,120,554, 4,339,777, and 3,796,347, respectively. The value of agricultural products in 1907 was 12,000,000,000 marks, that of the industries 10,000,000,000 marks. On this basis Germany is still regarded as an agricultural country which offers opportunity for the employment of labor in agriculture in times of industrial crisis.

The reestablishment of the peasantry, VON FRIESENHOF (*Monatsh. Landw., 3 (1910), No. 8, pp. 243–261*).—This article calls attention to the agitation for the establishment of small holdings and making more prosperous the existence of the peasant class in Germany, but points out the numerous difficulties affecting the problem from the economic point of view.

The economic principles and duties of cooperative credit societies, H. CRÜGER (*Rev. Écon. Internat., 7 (1910), III, No. 2, pp. 209–235*).—This is a detailed review of the origin and development of the mutual credit movement among the agricultural and industrial middle classes in Germany, with a discussion of the fundamental principles of the Schulze-Delitzsch and Raiffeisen systems, the legal definition of cooperative credit societies, the number and duties of such societies, their competition with savings banks and commercial banks, the discounting of trade debts, and the activity of credit cooperation.

The conclusion of the author is that after more than 50 years of experience the question of a sound and practical system of credit for the middle classes has found its solution in the mutual credit movement, which requires no form of government aid to enable it to carry out successfully its true functions and duties.

What are the advantages to a dairy cooperative society of a saving and loan bank in the same place? J. SCHULTZE (*Molk. Ztg. [Hildesheim], 24 (1910), No. 75, pp. 1415, 1416*).—The advantages secured to dairy farmers by the establishment of a bank in the neighborhood of cooperative societies are the interest obtained for their money when deposited with the bank, the facilitating of financial transactions between dairy associations and customers, the lessening of the danger of the misuse of the association's finances, and the maintaining of a more uniform control over the price of milk. The cooperation of societies with private banks it is believed would work for the advantage of both as well as for the general welfare of the rural population in such localities.

Concerning the development of the German agricultural cooperative societies, GRABEIN (*Fühling's Landw. Ztg., 59 (1910), No. 17, pp. 588–594*).—This article presents and discusses the statistics on the number, membership, trade relations, and financial conditions of the various cooperative and mutual credit societies in Germany. On June 1, 1910, the number of societies affiliated with the national union was 23,845, as compared with 22,899 the preceding year.

Regulations for the execution of the law of January 2, 1910, concerning agricultural credit [in Italy] (*Bul. Mens. Off. Renseig. Agr. [Paris], 9 (1910), No. 9, pp. 991–1002*).—Noted from another source (E. S. R., 23, p. 796).

Report on agricultural mutual insurance societies in Tunis, VARREY (*Bul. Dir. Agr. Com. et Colon. [Tunis], 14 (1910), Nos. 54, pp. 74–86; 55, pp. 172–183*).—This article points out the numerous advantages of mutual insurance societies for farmers, as compared with regular companies, that have been secured in France. The method of organizing and conducting such societies is described in detail and a plea is made for their establishment in Tunis as a means of improving the economic status of the peasants and farmers by giving them protection against losses from fire and hail.

The insurance against accidents at agricultural labor, C. M. Mazzini (*Atti R. Accad. Econ. Agr. Georg. Firenze, 5. ser., 7 (1910), No. 3, pp. 254–271*).—This article gives a historical review of agitation in Italy for workmen's insurance against accidents and for the extension of its benefits to agricultural laborers, including an account of recent legislative efforts in this direction.

The difficulties surrounding the problem from the legislative and economic points of view are presented, particularly the fact of the large number of small proprietors in Italy, more than two millions of whom would be excluded from the benefits of insurance against accident if the law contemplated by the government should be passed. The author, in view of the evidence presented, makes three suggestions for improving the proposed law, these relating to the fixing and establishing of premium rates according to the amount of land tax paid by small holders, the control of the funds by the national bank, and the triennial regulation of premium rates according to the results secured through the operation of the law during the preceding 3-year period.

Agricultural statistics.—Chattel mortgages, J. S. Duff (*Ann. Rpt. Bur. Indus. Ontario, 1909, pp. 47*).—Statistics are given and discussed on the acreage, yields, and market prices of field crops, live stock and dairy production, farm labor and wages, meteorological data, areas assessed in the county municipalities, values of farm property, implements, and live stock, and the value of chattel mortgages both against all occupations and against farmers on record and undischarged in the Province of Ontario, on December 31, 1909.

There was a sufficiency of farm labor in general, though in some localities a scarcity was reported. Wages ranged from $15 to $35 a month and from $1 to $2 a day during harvest with board, according to the experience and ability of the man. Many native-born farm hands during the year went west and most of the immigrants taking their places proved failures. The domestic servant question on farms has also not yet found a satisfactory answer.

The number of farm mortgages was 6,816 to secure existing debts amounting to $2,730,119, as compared with 7,098 and $2,768,786, respectively, the preceding year (E. S. R., 22, p. 193).

The cereal harvest in the northern hemisphere, U. Ricci (*Internat. Inst. Agr. [Rome], Bul. Agr. Statis., 1 (1910), No. 11, pp. 111–122*).—Statistics of areas under cultivation and yields of wheat, rye, oats, barley, corn, and rice for the years 1909 and 1910 are presented and discussed in this bulletin.

Annual review of the grain trade, G. J. S. Broomhall (*Liverpool, 1910, pp. III+102*).—This volume presents and discusses the statistics of production, imports, and exports of wheat, corn, oats, barley, rye, and rice by the chief grain producing and grain consuming countries for the years 1903 to 1910, inclusive. For some countries similar data are given for flour, potatoes, beans, peas, linseed, oilcake, and other farm products.

AGRICULTURAL EDUCATION.

Agricultural instruction in the public high schools of the United States, C. H. Robison (*Thesis, Columbia Univ., 1910, pp. 202, map 1*).—This is a thesis submitted in partial fulfillment of the requirements for the degree of doctor of philosophy at Columbia University. The investigation was made while the author was a collaborator of this Office, and involved the collection of data by correspondence, by the examination of catalogues, reports, and other printed material, including many of the publications of the Office and of the U. S. Bureau of Education, and by personal visits to schools and conferences with school men. It comprises the most comprehensive study of high school instruction in agriculture that has been made in this country.

The book contains seven chapters and two appendixes. The first chapter deals with the development and present status of agricultural education in the United States; the second with agriculture in the public high schools, including statistics of schools teaching agriculture as a separate subject and those teaching it incidentally; the third describes the work, equipment, and methods of instruction in typical high schools visited by the author, including some that taught agriculture one year or less, some three or four years, and one that taught it incidentally; the fourth discusses problems of administration, agricultural equipment, and methods of teaching, including such matters as the time given to agriculture, the relation of agriculture to other school subjects, field work, and books used; the fifth contains interesting data concerning the preparation and salaries of teachers of agriculture in high schools; the sixth discusses briefly the different types of special secondary schools of agriculture; and the seventh deals with problems of agricultural instruction in the secondary schools, such as the effect of establishing special schools, the attitude of colleges and universities, the difficulties of the curriculum, and the difficulties of instruction. One of the appendixes contains a summary of legislation pertaining to agricultural instruction in public high schools and the other a list of references on agricultural education.

Scattered throughout the work are 54 tables giving in condensed form the results of the author's investigations, and these with the topical index will render much valuable information available to students of education.

Course of study in agriculture, D. W. FREAR (*Denver: State Supt. Pub. Instr., 1910, pp. 21*).—This is a brief outline with some suggestions for laboratory and field exercises in agriculture for the seventh and eighth grades of the public schools of Colorado.

Soil studies, D. W. WORKING (*W. Va. School Agr., 1 (1910), No. 1, pp. 20, figs. 13*).—Simple lessons for school teachers and pupils are given concerning the nature and consistency of soils and their relations to soil moisture, air, earth organisms, and other organic matter contained in them, with suggestions concerning tillage and soil management. Numerous suggestions are given for exercises in connection with the lessons and references to text-books and bulletins are appended.

Pen pictures of standard cotton grades, N. J. MCARTHUR (*1910, pp. 109, pl. 1*).—This work, which is designed for use as a text-book in the common schools of the cotton belt, is written largely in the style of a catechism. It covers the various cotton grades and a description of the different impurities, stains, and other so-called demerits which influence the establishment of grades. The pen pictures have been combined with a former text entitled The Cotton Grader by the same author.

[Meteorology and nature study] (*Nature-Study Rev., 6 (1910), No. 9, pp. 257–271, charts 2*).—This contains the following articles:

The weather as nature study, J. Dearness (pp. 257–263).—Suggestions are given for observations and school-room instruction concerning the elementary features of weather study.

The use of weather maps as source materials, C. H. Robison (pp. 263, 264).—Suggestions are made for using the weather maps issued by the Weather Bureau of this Department in nature-study work.

Weather records in the lower grades, F. L. Charles (pp. 265–271).—Suggestions for work of this kind are accompanied by forms for daily records.

Potatoes and oats as nature-study topics, ALICE J. PATTERSON (*Nature-Study Rev., 6 (1910), No. 8, pp. 226–234, figs. 2*).—The experience of the author in using potatoes and oats in nature-study work is narrated in considerable detail.

Seeds and seedlings, D. W. WORKING (*W. Va. School Agr., 1 (1910), No. 2, pp. 40, figs. 22*).—Seeds are described and lessons on germination, the composition of seeds, and their uses are outlined, together with numerous demonstrations and exercises to be performed by teachers and pupils. References to available literature are given.

Weeds, F. L. HOLTZ (*Nature-Study Rev., 6 (1910), No. 8, pp. 237–245, figs. 4*).—The value in botanical study of weeds as compared with showy flowers such as roses, violets, and sunflowers, is pointed out and some interesting botanical and economic points concerning weeds are given.

Poultry laboratory guide, H. R. LEWIS (*New York, 1910, pp. IX+120, pls. 24*).—The laboratory manual is intended for short-course work where classes are large and a large amount of practical work must be crowded into a short period of time.

Several chapters are devoted to poultry houses, their arrangement and equipment, and these are followed by discussions of different methods of yarding, handling eggs for incubation, incubator cellars and incubators, natural incubation, the elements of embryology, brooding by natural and artificial methods, and many other details in the care and management of poultry. Rather more attention than usual is paid to preparing poultry for market, poultry bookkeeping, poultry records, methods of advertising, scoring and grading eggs, scoring poultry plants and poultry, systems of heating, and the making of the necessary repairs.

Poultry contest, J. DRYDEN (*Oreg. Agr. Col. Bul., 1. ser., 1910, No. 45, pp. 16, figs. 6*).—This bulletin gives the result of the poultry contest of the Portland Junior Poultry Association, which ended October 31, 1910.

Outlines are given of the plan of the contest, the prizes offered, and the results attained by the 21 boys and girls engaged in it. The winner of the $100 prize secured from 22 hens an average of 140 eggs per year, valued at $4.24. The cost of feed per hen was $1.22, leaving a net annual profit of $3.02 per hen.

Sewing lessons for rural schools (*Hampton Leaflets, n. ser., 6 (1910), Nov., pp. 31, figs. 37*).—Illustrated directions are given for the various simple and fancy stitches, as well as for making quite a number of articles of clothing and a few pieces of fancy work.

School gardens and kindergartens, H. PUDOR (*Gartenflora, 59 (1910), No. 24, pp. 532–536*).—The author discusses the growing tendency in systems of education to use animate rather than inanimate subject matter, thus making the school garden an organic feature of education. The Austrian school law pronounces the school garden a necessary adjunct of every public school and requires communities to provide for every school a plat of ground for gardening. The author also indicates (1) how a system of development in school-garden work may be pursued as in other subjects of instruction, (2) how botany, zoology, arithmetic, geometry, plane surveying, drawing, mineralogy, and geology, as well as physics and chemistry are benefited by school-garden work, (3) the advantages of the work as a source of recreation and the acquisition of a sense of order, a love of the beautiful, independence, individuality, and originality, and (4) its ethical and hygienic value.

School gardens in St. Paul, D. LANGE (*Minn. Hort., 38 (1910), No. 4, pp. 121–124, pl. 1*).—The development of school gardens in St. Paul is described and some details concerning the work in 1909 are given.

List of books recommended for grange libraries (*Maine [Univ.] Bul., 13 (1910), No. 1, pp. 14*).—This list, compiled by members of the faculty of the college of agriculture of the University of Maine, includes 75 titles of popular books relating to agriculture, domestic science, and rural life, arranged alphabetically and with descriptive notes in each case.

Some good books for farmers and others interested in affairs in the country, C. R. Green (*Facts for Farmers [Mass. Agr. Col.], 1 (1910), No. 4, pp. 4*).—This is a selected list in which the names of the author and publisher, the price of the book, and a brief abstract of it are given.

MISCELLANEOUS.

Twentieth Annual Report of Washington Station, 1910 (*Washington Sta. Rpt. 1910, pp. 18*).—This contains the organization list, a report of the work and publications of the station during the year, and a financial statement for the fiscal year ended June 30, 1910.

Twentieth Annual Report of Wyoming Station, 1910 (*Wyoming Sta. Rpt. 1910, pp. 77, fig. 1*).—This contains the organization list of the station, a financial statement for the fiscal year ended June 30, 1910, and reports of the director and heads of departments, the experimental work of which is abstracted elsewhere in this issue. Variety tests of field peas and potatoes are also included.

Report of the department of agriculture of Sweden, 1908, M. von Feilitzen (*K. Landtbr. Styr. [Sweden] Underdåniga Ber. 1908, pp. 483+VIII, maps 2*).—The report contains brief accounts of the measures for advancing Swedish agriculture and its various branches which are supported by the government.

Report of the department of agriculture of Norway, 1909, G. Tandberg (*Aarsber. Offentl. Foranst. Landbr. Fremme, 1909, I, Statsforanst., pp. LXVII+641, figs. 22*).—The various government measures for the advancement of agriculture in Norway for the year are described in detail. Of more general interest may be mentioned the annual reports of the entomologist, the chemical control stations, at Christiania, Bergen, and Trondhjem, the dairy schools, the milk control stations, and the cow-testing associations, meteorological data, and trials with eradication of weeds.

Report of Ultuna Agricultural Institute, 1909 (*Red. Ultuna Landtbr. Inst. [Sweden], 1909, pp. 134, pl. 1, figs. 3, chart 1*).—In addition to the usual account of the instruction work of the institute, the report contains special articles on the following subjects: The Weather at Ultuna, 1909, by G. Timberg; on Determination of Humus Substances in Clay Soils, by A. Vesterberg; Field Trials at Ultuna Farm, 1909; Trials Concerning the Increase in Growth of Root Crops and the Influence of Distance of Planting on the Yields Obtained, by A. Sjöström; Higher Agricultural Instruction in France and Belgium, with Special Reference to Instruction in Animal Husbandry, by E. O. Arenander; Report of the Ultuna Substation of the Swedish Seed Grain Society, 1909, by A. Elofson; and Report of Ultuna Agricultural School and Farm, 1908–9, by W. Melin.

Foreign literature relating to soils and agronomy, 1906 and 1907, A. Christensen (*Tidsskr. Landbr. Plantcavl, 16 (1909), No. 5, pp. 759–816; 17 (1910), No. 4, pp. 640–692*).—Extended bibliographies of the subjects of the atmosphere, soils, chemical composition, nutrition, and production of agricultural crops, seeds, etc., for the years 1906 and 1907 are given.

Some observations from a visit to America, B. Böggild (*Mælkeritid., 23 (1910), No. 49 b, pp. 1109–1152, figs. 31*).—Some of the author's impressions of agricultural and dairy conditions in the United States, gathered during his visit to this country in 1910, are given.

NOTES.

Colorado College.—An agricultural demonstration train with 4 carloads of illustrative material from the college, and with over 200,000 pieces of farm literature for distribution, was sent out in March over the entire systems of 3 railways in the State.

James D. Marshall (Wisconsin, 1910) has been appointed instructor in agronomy.

Connecticut College and Station.—The dairy department has acquired a power outfit for the manufacture and storage of ice cream.

Delaware College and Station.—The recent legislature appropriated $10,000 to complete the equipment of the college farm, $10,000 for general repairs and maintenance, and $9,000 for agricultural extension.

Georgia College and Station.—The educational train operated by the college of agriculture in cooperation with the railroads has completed its tour of the State, reaching the great majority of the counties, making 160 stops, and being visited by 350,000 persons. It is reported that the great interest taken in this enterprise is resulting in many changes in agricultural practice, and that it has been the medium of a closer cooperation between the city and country.

J. D. Price and M. G. Gamble have been appointed to the board of directors, vice James B. Park and George Gilmore.

Illinois University and Station.—An educational trolley train was sent out by the extension department over the lines of the Illinois Traction System, February 27 to March 10. The train was run in the interest of the rural schools and was equipped and provided with specialists from the college of agriculture, who cooperated with the county superintendents of 9 counties.

The second annual conference on the teaching of nature-study agriculture in the rural elementary schools of Illinois was held at the college January 18–21, in connection with the short course in agriculture.

O. D. Center, associate in crop production in the college and first assistant in crop production in the station, resigned April 1 to accept the position of superintendent of state farmers' institutes for Illinois, with headquarters at Springfield, Ill. Burt L. Rickards, chief of laboratories of the Ohio State Board of Health, has been appointed assistant professor of dairy bacteriology and municipal milk methods.

Purdue University and Station.—At the recent session of the state legislature agricultural extension in Indiana was given material support through the passage of a bill which provides an appropriation of $10,000 for the fiscal year ending September 30, 1911, and $30,000 annually thereafter. This appropriation is in addition to an annual grant of $10,000 provided by the State for extension work by the station and is further supplemented by a clause in the act under which each county may appropriate for local expenses, such as hall rent, printing, etc., 25 cents per square mile, which gives a further increase of about $11,000.

It is expected that this legislation will do much to encourage extension activities in the State. A department of agricultural exension has been established to have direct charge of the extension work of the university and to be coordinate in rank with the school of agriculture and the station. Prof. G. I. Christie, previously superintendent of agricultural extension, has been designated head of the new department. The lines of work contemplated at present include instruction to farmers through short courses, farmers' institutes, educational trains, conferences, clubs, etc.; demonstrations in spraying, pruning, hog-cholera vaccination, county farm tests, etc.; the development of rural school agriculture by the preparation of study outlines, charts, school collections, lectures, assistance in schools, etc.; work in domestic science, with lectures, demonstrations, etc.; and the preparation and dissemination of publications on these various lines.

Iowa College.—W. R. Hechler, a recent graduate of the University of Missouri, has been appointed instructor in farm crops.

Kansas College and Station.—Paul N. Flint, of the Arkansas University and Station, has been appointed assistant professor of animal husbandry, and has entered upon his duties.

Michigan College.—The entrance requirements have been increased to a minimum of 15 high school units, of which from 1 to 3 may be offered in agriculture. Correspondence courses in agriculture and home economics have been established.

Minnesota University and Station.—A short course for boys and girls who won prizes in the various county agricultural and domestic science contests was held during the week of March 26, with an enrollment of 106. T. D. Urbahns, assistant in entomology in the station, has resigned to accept a position with the Bureau of Entomology of this Department in connection with its alfalfa weevil investigations.

Missouri University.—According to a note in *Science*, the maintenance appropriations for the ensuing biennium exceed those at present by $152,000. There is also an appropriation of $60,000 for a laboratory for agricultural chemistry.

North Dakota College.—According to data recently published in *Breeder's Gazette*, $46\frac{2}{3}$ per cent of the graduates of the agricultural course are now engaged in experiment station work, $16\frac{2}{3}$ per cent are farming, $13\frac{1}{3}$ per cent are teaching agriculture in agricultural colleges, 10 per cent are teaching agriculture in high schools, 10 per cent are agricultural extension lecturers and demonstrators, and $3\frac{1}{3}$ per cent are connected with farm journals. Of the graduates from the farm husbandry course, nearly all are located in the State and 72 per cent of their number are farming, while 20 per cent have taken the college course in agriculture or veterinary science. Of the 1,582 young men who have taken the shorter courses in agriculture during the past 5 years, 95 per cent are said to be employed in farm work.

Porto Rico Federal Station.—Charles N. Ageton, instructor in chemistry at the Washington College, has been appointed assistant chemist and has entered upon his duties.

Clemson College and Station.—The work in animal husbandry and veterinary science has been recently reorganizd. Dr. E. Barnett, who has been station animal husbandman and veterinarian, retains the work in veterinary science and becomes associate animal husbandman, while Archibald Smith, assistant in animal husbandry in the division of extension work and farmers' institutes, has been appointed animal husbandman in the station and professor of animal husbandry in the college, giving special attention to the work in dairying. It is planned to expend from $75,000 to $80,000 in the near future in the development of the animal husbandry interests of the State. A new dairy building to cost over $20,000 is being erected, and the old dairy barn which is to be utilized for farm machinery is to be replaced by a modern structure costing over $15,000, for which land has recently been acquired.

The entomological divisions of the college and station have been combined by the appointment of A. F. Conradi as professor of entomology in addition to his present duties as station entomologist, and of W. P. Gee as assistant professor of entomology in the college. Herbert Johnson Smith, instructor in chemistry at the Mississippi College, has accepted the position of assistant professor of chemistry, and has entered upon his duties. A correspondence course in agriculture for teachers has been inaugurated under the direction of the division of extension work and farmers' institutes.

Canada Experimental Farms.—J. H. Grisdale, agriculturist for 11 years at the Central Experimental Farm and Dominion agriculturist for the last year, has been appointed director of the Dominion Experimental Farms, vice Dr. William Saunders, who has retired.

Association of American Agricultural Colleges and Experiment Stations.—The twenty-fifth annual convention will be held in Columbus, Ohio, November 15–17, 1911. The Ohio State University will extend all available facilities for the use and convenience of the association.

Department of Superintendence of the National Education Association.—The program of the Mobile meeting, February 23–25, was devoted to the general topic Educational Achievement and Educational Endeavor at the Close of the First Decade of the Twentieth Century, and from the frequent mention made of agricultural education, it would appear that one of the important achievements of this decade is a realization of the importance of extending instruction in agriculture from the agricultural college downward into the secondary and elementary schools.

In the session devoted to achievement and endeavor in cooperation there was frequent mention of the progress made in teaching agriculture and in the organization of boys' and girls' rural life clubs, and in the last general session, when all of the papers discussed the Progress and True Meaning of the Practical in Education, one of the principal addresses was by P. G. Holden, of the Iowa College, who reviewed recent progress in teaching agriculture in elementary and secondary schools, and interpreted the meaning of the practical in teaching agriculture. C. B. Gibson, in a paper dealing with progress in vocational training, also gave much credit to recent developments in agricultural education.

In summing up the discussion for the afternoon, Carroll G. Pearse, of Milwaukee, maintained that boys and girls should be taught to live in the world to-day, and hence that vocational education has a place in the schools. Continuing, he said "nothing is so big and important as what lies before us in the agricultural development of our country." Not only the lawyers and other professional men have the right to vocational education, but the man who works with the hoe, the ax, the awl, and the hammer, but in providing for the extension of vocational instruction downward, there should be avoided the danger of neglecting essentials in intellectual instruction such as good English, mathematics, and the other fundamentals of education.

The National Committee on Agricultural Education held two meetings, at the first of which the principal paper was on Agricultural Education in the North, by J. W. Heston, president of the South Dakota State Normal School, who reviewed conditions in the North with reference to teaching agriculture in colleges, special agricultural schools, normal schools, and public schools. In the absence of J. D. Eggleston, who was announced for a paper on Agricultural Education in the South, D. J. Crosby of this Office gave a similar review of conditions in that section.

At the second meeting of the committee H. H. Seerley gave a review of the change in sentiment and in conditions relating to agricultural education since the committee was first organized five years ago. This change has been apparent not only in the establishment of new agricultural institutions, but in the widespread growth of sentiment in favor of teaching agriculture quite generally in the public schools.

Exhibits of work in agriculture and domestic science as conducted at Winthrop College in South Carolina and the Alabama Girls' Normal and Industrial

School were displayed at the place of meeting, and a luncheon was served by the domestic science department of Winthrop College, the menu being made up from vegetables grown in the school garden and articles cooked by the domestic science students.

Faunce Demonstration Farm at Sandwich, Mass.—A recent issue of the *New England Homestead* contains an account of the demonstration farm now being conducted at Sandwich, Mass. This farm became available in 1909, following the death of Dr. R. H. Faunce, a local physician, who had bequeathed it with about $20,000 of other funds to a board of four trustees for use in benefiting the people of Barnstable County agriculturally. Plans for its most effective utilization were considered by the trustees in active cooperation with the Massachusetts Agricultural College, and the decision reached to operate it as a demonstration center in connection with the college extension department and with Profs. W. D. Hurd, W. P. Brooks, and F. C. Sears as an advisory committee. Albert W. Doolittle, of the University of Maine, was selected as superintendent and began operations in March, 1910.

The estate contains about 250 acres of woodland, 8 acres of cleared land, and several farm buildings. The aim has been to demonstrate the agricultural possibilities of the Cape Cod region, special attention being given to fruit growing, market gardening, and poultry raising. A poultry plant has been provided, gardens and orchards established, and arrangements made for a further development this year.

Much of the work has been in close association with the local schools and a feature is the giving of advice to farmers in the vicinity. A two days' agricultural and civic betterment conference was held April 7–8, the farm serving as a nucleus for the gathering.

Farm-Life Schools in North Carolina.—The legislature of North Carolina has passed a law providing for a "county farm-life school" in each county complying with certain provisions of the act. The schools can not be located in any city or town of more than 1,000 inhabitants, nor within 2 miles of any city or town of more than 5,000 inhabitants. The county, township, school district, or all these combined must provide at least $2,500 a year for maintenance, and must also furnish equipment consisting of a school building, dormitory buildings for not less than 25 boys and 25 girls, a barn, a dairy building with the necessary equipment, and a farm of not less than 25 acres of good land. It is expected that all of the buildings will be located on the farm and these must be constructed in accordance with plans approved by the state superintendent of public instruction.

The high school departments maintained under the present state law are to be conducted in connection with each county farm-life school. The teachers must hold the prescribed high school teachers' certificates on all required subjects except Latin, Greek, and modern languages. Men must also have certificates from the state board of examiners and the president of the North Carolina College of Agriculture and Mechanic Arts, attesting to satisfactory qualifications for their special work, while the women must have similar certificates from the state board of examiners and the president of the State Normal and Industrial College. Provision is to be made in these schools for regular courses in agriculture and home economics, and also for extension and demonstration work, and short courses for adult men and women.

A school meeting all of the requirements imposed by this law may receive from the State $2,500 annually for maintenance, except that not more than 10 schools may be established in any one year and not more than one such school in any county.

O

EXPERIMENT STATION RECORD.

CONTENTS OF VOL. XXIV, NO. 7.

SUBJECT LIST OF ABSTRACTS.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

METEOROLOGY—WATER.

SOILS—FERTILIZERS.

AGRICULTURAL BOTANY.

FOODS—HUMAN NUTRITION.

ANIMAL PRODUCTION.

DAIRY FARMING—DAIRYING.

VETERINARY MEDICINE.

RURAL ECONOMICS.

AGRICULTURAL EDUCATION.

MISCELLANEOUS.

LIST OF EXPERIMENT STATION AND DEPARTMENT PUBLICATIONS REVIEWED.

NOTE.—The price of *Experiment Station Record* is $1 per volume, and two volumes are issued annually. It may be purchased from the superintendent of documents, Washington, D. C., to whom all remittances should be made. The publications of the State experiment stations are distributed from the stations and not from the Department.

EXPERIMENT STATION RECORD.

VOL. XXIV. JUNE, 1911. No. 7.

Previous descriptions in these pages of the respiration calorimeter, designed for studies in human nutrition under this Office, have shown the development of the apparatus as an instrument of precision and brought out its application in studying the physiological processes of nutrition. Recently changes have been made which greatly simplify and improve its operation, and it has been applied to a new line of research in a quite distinct field, the possibilities of which can be as yet only barely suggested.

In moving the apparatus from Middletown, Conn., where it was originally constructed, it was necessary to dismantle and dissect it quite completely, so that its erection in the laboratory provided for it in the new building of the Department involved in large measure its reconstruction in many important details. In this reconstruction the general plan and principles of the apparatus which had given such good results were retained, but numerous improvements and some new accessory apparatus were introduced which make for ease, accuracy, and economy of operation, and which are of interest to those following the refinement of this method of investigation.

As the apparatus is very complicated and technical, some knowledge of its construction and the principles on which it operates is necessary to a general understanding of the changes which have been made. It will be recalled that the apparatus combines the features of a respiration apparatus and a calorimeter. It consists in primary terms of an air-tight and heat-tight chamber of suitable size to accommodate a subject during an experiment, provided with devices for measuring and recording the products of respiration and the heat liberated. The apparatus is of the closed-circuit type, the same air being passed through the respiration chamber continuously as a ventilating current. The products of respiration, carbon dioxid and water, are absorbed in the course of the circuit, and oxygen is supplied to replace that used up by the subject.

The calorimeter features, by which the heat is determined which the subject liberates as a result of the vital processes of the body or of external muscular labor, call for the highest degree of refinement. It is this heat measurement which enables the calculation of the energy expended by the subject in various operations, the available energy of food, the conservation of energy in the human body, and the efficiency of the body as a machine. The apparatus is, of course, provided with facilities for supplying the subject with food, and for collecting the liquid and solid excreta. There is also provision for determining body temperatures, respiratory movements, and similar factors whenever experimental conditions necessitate it.

It will be recognized that these measurements of heat, of carbonic acid, and of water to be of value call for a high degree of accuracy, and require a very delicate and finely adjusted mechanism, sensitive to slight changes from within and protected from fluctuations without. The manner by which this is accomplished is quite technical, but some of the leading features may be readily understood.

The respiration chamber, about 6½ by 6½ by 4 feet in size, is made up of double metal walls, the inner one of copper and the outer one of zinc, the two being separated by a small space. They are provided at frequent intervals with thermal junctions, or thermocouples, which are arranged in series. The latter being composed of two different metals, any difference between the temperature of the inner and outer walls sets up a current which is indicated by a galvanometer outside the chamber. The new thermocouple has been improved and made more efficient, and a simpler switch has been devised to connect the various groups of thermocouples with the galvanometer.

Outside the zinc wall is an air space surrounded by a wall of cork board 1½ inches thick, which is a very excellent heat insulator and protects the inclosed air space from changes in the laboratory temperature. The cork layer is protected in turn by an outer covering of asbestos lumber, in place of the former wooden covering, put on in panels and bound together with brass strips. The wooden framework formerly used has been replaced by a skeleton of structural iron to which the walls are attached, raised above the laboratory floor, the whole structure being very rigid. Throughout the construction attention has been given to details which make for simplicity and convenience, and the outer covering is so arranged that it may be easily removed, affording access to all parts of the zinc wall and to the devices attached to it.

To prevent the passage of heat through the zinc and copper walls in either direction, the dead air space surrounding the zinc wall is kept at practically the same temperature as the air within the chamber, advantage being taken of the well-known fact that no passage of heat occurs between two bodies having the same temperature. To maintain this equilibrium the air space is provided with a system of electric resistance wires for heating and of small water pipes for cooling, as conditions may require. The numerous thermal junctions between the inner (copper) and outer (zinc) linings show the attendant at once by means of the galvanometer any difference in temperature between the two linings, which difference can then be equalized by supplying heat through the electric wires or cold through the water pipes in the air space just outside the zinc wall. In this manner a balance is readily maintained which checks the escape of heat and makes its accurate measurement possible; and in actual practice little change is needed after the apparatus has been adjusted.

Heat given off by the subject is determined by means of a current of water passing through a heat-absorbing device within the chamber. The rise in temperature of the water in its passage through the absorber multiplied by the weight of water gives the number of calories of heat produced.

Formerly this measurement of the heat was effected by reading and recording two mercury thermometers every two minutes throughout the experiment, one thermometer showing the temperature of the water as it entered the heat absorbers and the other as it left. This was a confining and tedious operation, subject to error due to the individual factor in making the readings. Such errors could not be detected, and in experiments running continuously for several days it was difficult for even the most careful observers to guard against them.

In the new apparatus the measurement of heat is accomplished by means of two ingenious automatic electrical devices operating quite independently of the observer. One of these regulates the temperature of the ingoing water and the other measures and records the temperature difference in the water before and after passing the heat absorber. These devices greatly reduce the labor of attendance and eliminate a possibility of serious error. Together they constitute the most important recent improvement made in the apparatus. The accuracy and reliability with which they operate throughout a long experiment is a triumph of electrical skill.

The regulating device brings the temperature of the water entering the heat absorbers entirely under control and renders it uniform after the device has been set for the desired temperature. The water flowing toward the heat absorber is first cooled to a temperature below that desired, in order to bring it under control; and at a point in the circuit just outside the chamber it passes through a narrow channel, where it is heated by a current of electricity passing through a resistance wire. It flows next through a small mixing device to equalize its temperature, and then through another small channel in which it surrounds an electric resistance thermometer. This thermometer forms one arm of a Wheatstone bridge. The galvanometer in the bridge circuit is connected with an apparatus governing the action of a small motor, which actuates a rheostat so as to increase or decrease the quantity of current in the heater.

The heating effect in the wire that heats the water flowing toward the absorber is thus regulated to give the exact degree of heat desired, the amount of heating being that required to produce a balance of resistance in the Wheatstone bridge. The mechanism actuating the rheostat can be set by means of a graduated slide wire on the bridge to control the heating to five one-hundredths degree, or even less.

The new device which records the increase in temperature of the water after flowing through the heat absorber is likewise electrical, is automatic in its operation, and furnishes a continuous record. Resistance thermometers are placed in the water at the points where it enters and leaves the heat absorber. These thermometers represent two arms of a Wheatstone bridge, the galvanometer of which is connected with a mechanism which actuates a pen on a moving record sheet. In accordance with the deflection of the pointer of the galvanometer the pen is deflected to the right or left, the total movement of the pen depending on the difference in the temperature of the two thermometers, i. e., on the increase in temperature of the water after flowing through the heat absorbers.

The pen responds to a change of five one-thousandths degree, and the device gives a reading every seven seconds, or practically a continuous record in place of the old reading every two minutes. The record shows to one one-hundredth degree the temperature differences in the water at entering and leaving the heat absorbers. From the average of these differences for a given period, measured by a planimeter, and the amount of water passing the absorbers, which is determined by weight, heat eliminated by the subject in the chamber is determined with great accuracy.

These two devices, for controlling the temperature of the water entering the calorimeter chamber and for recording its increase in temperature in passing through the heat absorbers, represent a marked advance in calorimetry and in the development of the apparatus. They do away with a large amount of labor attendant upon operating it, and eliminate the possibility of errors of observation and record. The observer operating the calorimeter now devotes his attention chiefly to maintaining the temperature of the zinc wall in equilibrium with that of the copper wall and in weighing at intervals the water which comes from the heat absorber. Plans have been perfected in detail for regulating the temperature of the zinc wall automatically.

The installation of a refrigerating plant in connection with the respiration calorimeter is another decided improvement. This is employed for lowering the temperature of the water used in cooling the air space, which will materially extend the season through which the apparatus can be operated. With a human subject the respiration chamber is maintained at a temperature of approximately 68° F., and in warm weather it has heretofore been impossible to operate the apparatus on account of the temperature of the water.

The devices for determining the carbon dioxid and water vapor removed from the chamber in the ventilating air current remain practically the same as in the former apparatus, but a much simpler appliance is employed for equalizing the air pressure and also a simpler meter for measuring the quantity of air for residual analysis. The new apparatus also embodies improved methods for operating the devices for purifying the air current after it leaves the respiration chamber, and for restoring oxygen to it on its return. There has also been a decided improvement made in the apparatus for determining the temperature of the air and the copper wall of the chamber, and in the devices for controlling the temperature of the air surrounding the zinc wall. These, however, are technical details which need not be further described.

During the past winter and spring a series of check tests has been made with the calorimeter which has demonstrated its high efficiency and accuracy, and a variety of experiments have been conducted with a subject. In the latter the scope of the experiments has been greatly enlarged. The experiment has included such questions as the labor in digesting different foods. For example, meat and cheese prepared in different ways have been studied; while an extended series of experiments is to be undertaken to compare different vegetable oils and animal fats and fat constituents with reference to their relative value as sources of energy in the body, and to supplement data regarding the relative value of culinary and table fats of different kinds.

Of late a new line of experiments has been undertaken with the respiration calorimeter, which marks a departure in studies of this kind and indicates a broader application of the apparatus. These new studies relate to problems connected with the ripening of fruit, and are being carried on in cooperation with the Bureau of Chemistry. They have shown that the apparatus is suited to studies of the changes going on during ripening, and that as a living body the functions of the plant as well as of animals may be observed.

A number of bunches of green bananas were placed in the respiration chamber and kept under observation until the ripening process was completed to the usual commercial stage, which requires three or four days. During this time the oxygen consumption, the carbon-dioxid excretion, and the heat elimination were determined in a manner not previously possible, throwing interesting light on the chemical processes of ripening.

These experiments have been repeated sufficiently to check the results and suggest the nature of the changes. Important data have already been obtained regarding the respiratory quotient, the carbon dioxid thermal equivalent, and the amount of energy liberated by the bananas during the ripening process. The indications are that physical and chemical factors which are of the greatest value in the study of this problem, important from a practical as well as a theoretical standpoint, can be accurately measured with the respiration calorimeter. The results will assist in the interpretation of analytical studies and throw a new light on the problems involved in the ripening and storage of fruit. As the method is applicable not only to fruit of all kinds, but to vegetables and other products, it is believed to have a wide range of possibilities.

It has been suggested furthermore that some of the changes taking place during the germination of seeds, a subject which has been studied in other ways, could be more accurately determined. The heating of grain in storage is also a problem to the study of which the apparatus lends itself. With certain adaptations, which are believed mechanically possible, the apparatus might be used in connection with growing plants to study their transpiration, respiration, etc., as well as the energy required for these different physiological processes. But little is now known regarding the energy changes of plant activity, and this apparatus seems to afford a means for extending knowledge along that line. Indeed, the possibilities for the study of the respiratory exchange and energy production of vegetable products and plant life are well-nigh unlimited, and open up a line of investigation of great importance.

Another line of study under consideration is that of the gaseous exchange and energy metabolism of eggs during incubation. There has been considerable work on the carbon-dioxid elimination, the relation of moisture and the like, but no apparatus has thus far been employed in which these can be studied as effectively as in the respiration calorimeter, where a constant temperature can be maintained, the carbon-dioxid content of the air measured and regulated, the moisture governed, the energy changes followed, and other factors brought under control.

There are also important problems in the curing and storage of meat, like those in the ripening and storage of fruit, which the apparatus seems eminently suited to investigating.

The work thus far done marks the adaptation of the calorimeter to a new field of investigation in which it has not hitherto been employed, and in which investigation has been quite meager. It has demonstrated that the instrument is fully as well suited for the study of fundamental problems of plant life as it is for the study of similar problems of animal life. In practice it would doubtless be found advantageous to adapt it in size and possibly in other details to the new purposes. The new application has aroused much interest in the Department as its possibilities suggest themselves. Plans are already under consideration for cooperative experiments with different bureaus on a variety of plant problems, with the object of securing data needed in projects which these bureaus have under investigation.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Progress in the field of agricultural chemistry, A. STUTZER (*Chem. Ztg., 34 (1910), Nos. 133, pp. 1181, 1182; 134, pp. 1191, 1192*).—This is a review of the activities in agricultural chemistry during recent years. It considers plant chemistry and physiology, the soil and its constituents, fertilizers and fertilizing, and the physiology and nutrition of animals. A bibliography is included.

Man and the earth.—Man and plants, edited by H. KRAEMER (*Der Mensch und die Erde.—Der Mensch und die Pflanzen. Berlin, Leipsic, and Stuttgart, 1908, vol. 4, pp. XII+444, pls. 48, figs. 236*).—Part 1 of this volume deals with the general relation of plants to agriculture and horticulture. Part 2 takes up the cultivation of technologically important plants, e. g., plants which yield utilizable woods, fibers, coloring matters, fats and oils, wax, gums and resins, rubber, cork, etc., and those which yield foods and condiments, such as flour, sugar, fruits, nuts, spices, and fodder plants. Part 3 deals with the industrial utilization of the various varieties of wood. Part 4 discusses the relation of plant micro-organisms to man, including fermentation, preparation of alcoholic drinks, technologically important micro-organisms, micro-organisms of interest to agriculture, micro-organisms relating to the conservation of foods and vegetables, and the micro-organisms in the dairy. Part 5 notes the plant condiments, such as coffee, cocoa and chocolate, cola, spices, tobacco, Indian hemp, opium, and alcohol. Particular stress is laid in this volume on the chemical-technological processes involved.

On the refractive indices of certain proteins.—III, Serum globulin, T. B. ROBERTSON (*Jour. Biol. Chem., 8 (1910), No. 6, pp. 441–448*).—"The value of a in the equation $\frac{n-n_1}{c}.=a$, where n is the refractive index of the solution of the protein, n_1 that of the solvent, and c is the percentage concentration of the protein, has been determined for solutions of 'insoluble' serum globulin in fortieth-normal aqueous potassium hydroxid, fortieth normal aqueous hydrochloric acid, fortieth-normal potassium hydroxid in 25 per cent and in 50 per cent alcohol, and fortieth-normal potassium hydroxid in 25 per cent and in 50 per cent acetone.

"The value of a for 'insoluble' serum globulin dissolved in acid or alkaline water is 0.00229; this is, within the experimental error, identical with the value of a (0.00230) determined by Reiss for 'Pseudoglobulin II.'

"The value of a for insoluble serum globulin dissolved in alkaline 25 per cent alcohol is constant for the range of globulin concentrations employed and is 0.00202.

"The value of a for insoluble serum globulin dissolved in alkaline 50 per cent alcohol is 0.00119.

"The value of a for insoluble serum globulin dissolved in alkaline 25 per cent acetone is constant for the range of globulin concentrations employed and is, within the experimental error, identical with its value in water.

"The value of a for insoluble serum globulin dissolved in alkaline 50 per cent acetone is 0.00146."

On the refractive indices of solutions of certain proteins.—IV, Casein in alcohol-water mixtures, T. B. ROBERTSON (*Jour. Biol. Chem., 8 (1910), No. 6, pp. 507–511*).—The value of a in the equation $\frac{n-n_1}{c}=a$, (see p. 607) has been determined for casein in alcohol-water mixtures of varying alcohol content as follows:

In alcohol—free solution, 0.00149±0.00004; in 25 per cent alcohol, 0.00157±0.00005; in 50 per cent alcohol, 0.00149±0.00005; and in 75 per cent alcohol, 0.00125±0.00006.

A new sugar—verbascose, E. BOURQUELOT and M. BRIDEL (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 18, pp. 760–762*).—The sugar was obtained from the roots of *Verbascum thapsus* (common white mullein), and yielded on hydrolysis levulose, glucose, and galactose. It differs from stachyose in having a higher melting point and a higher optical rotation.

An improved method for the preparation of raffinose, H. E. ZITKOWSKI (*Amer. Sugar Indus. and Beet Sugar Gaz., 12 (1910), No. 9, pp. 324, 325, figs. 3*).—The author has worked out a comparatively satisfactory method for preparing raffinose from cotton-seed meal. About 600 gm. of raffinose hydrate was obtained from 150 lbs. of cotton-seed meal. See also a previous note (E. S. R., 24, p. 305).

Isolation of raffinose from beet-sugar products, H. E. ZITKOWSKI (*Amer. Sugar Indus. and Beet Sugar Gaz., 13 (1911), No. 1, pp. 8–10, figs. 7*).—A method is described which is based on the difference in solubility in absolute methyl alcohol of beet sugar and raffinose. The method gives more satisfactory results than those usually described for the purpose.

The estimation and characteristics of raffinose, A. HERZFELD (*Deut. Zuckerindus., 35 (1910), No. 43, pp. 830–832; abs. in Chem. Ztg., 34 (1910), No. 133, Repert., p. 546*).—For determining raffinose the inversion method was found to be the most efficient. The properties of raffinose are discussed.

Note on Dr. Backe's investigation of maltol and isomaltol, H. C. SHERMAN (*Jour. Indus. and Engin. Chem., 2 (1910), No. 10, p. 426*).—A note in regard to the question of priority (E. S. R., 23, p. 306).

General chemistry of the enzyms, H. EULER (*Allgemeine Chemie der Enzyme. Wiesbaden, 1910, pp. VIII+238, figs. 4*).—Chapter 1 deals with the special chemistry of the enzyms, chapter 2 with the physical properties, chapter 3 with activators (coenzyms), paralysers, and poisons, chapter 4 with the chemical dynamics of enzym reaction, chapter 5 with the influence of temperature and various rays upon enzym reactions, chapter 6 with chemical statics with enzym reactions, chapter 7 with enzymatic synthesis, chapter 8 with the specificity of enzym actions, and an appendix with methods.

In regard to invertase, H. EULER, E. LINDBERG, and K. MELANDER (*Ztschr. Physiol. Chem., 69 (1910), No. 2, pp. 152–166; Ark. Kemi, Min. och Geol., 4 (1911), No. 1, Art. 4, pp. 15; abs. in Zentbl. Biochem. u. Biophys., 11 (1911), No. 4, p. 185*).—The authors found that the same amount of invertase can be obtained when the dried yeast is extracted with water as when it is autolyzed. The preparation obtained by autolysis contained nitrogen 0.36 per cent, carbon 42.3 per cent, and ash 2.07 per cent. This, according to the authors, is the most active preparation thus far described.

Extraction of zymase by simple maceration, M. A. LEBEDEFF (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 1, pp. 49–51*).—The authors found that they could obtain an active solution of zymase by simply macerating yeast with water and filtering the extract.

About the use of nitron for estimating nitric acid in nitrates, A. M. WASILIEFF (*Zhur. Russ. Fiz. Khim. Obshch., Chast Khim., 42 (1910), No. 4, pt. 1, pp. 567–570; abs. in Chem. Ztg., 34 (1910), No. 107, Repert., p. 441*).—The author tested Busch's method (E. S. R., 16, p. 945) with the nitrates of potassium, ammonium, magnesium, zinc, cadmium, manganese, aluminum, and uranium, and found the results to be excellent.

A reaction for nitrites, G. ARMANI and J. BARBONI (*Abs. in Chem. Ztg., 34 (1910), No. 112, p. 994*).—The method consists of adding to 10 cc. of the solution to be tested from 4 to 5 drops of a saturated solution of benzidin in acetic acid. The coloration obtained varies from a yellow to a red, depending upon the concentration of the nitrites present.

Determination of the nitrogen which is in combination as cyanamid and dicyandiamid, A. STUTZER and J. SÖLL (*Ztschr. Angew. Chem., 23 (1910), No. 40, pp. 1873, 1874*).—This method, which was devised by N. Caro, is based on the fact that the cyanamid may be precipitated as a silver compound from an ammoniacal solution. The dicyandiamid is precipitated from the filtrate also as a silver compound by the addition of potassium hydrate. The nitrogen is determined in the precipitates by the Kjeldahl method.

Improvements in the exact determination of nitrogen in feces, I. K. PHELPS (*Abs. in Science, n. ser., 33 (1911), No. 844, p. 342*).—"The difficulties of an exact aliquot and of loss of nitrogen in drying the viscous material are met by each of two procedures. The first procedure consists in dehydrating the moist mass by treatment with acidified alcohol and ether and filtration. The dry residue is then sifted and the nitrogen determined in the residual material, consisting of undigested material, in the powder obtained by sifting (which represents the residue from food) and in the alcohol-ether extract.

"The second procedure consists in partially decomposing the moist material with concentrated sulphuric acid by heating in a steam bath until a homogeneous mass is produced. This is then aliquoted and the nitrogen determined in the aliquot.

"The test of accuracy and adaptability of these procedures shows that they are both excellent."

See also a previous note (E. S. R., 23, p. 615).

[Detection of phosphates with the molybdate reagent], R. E. LIESEGANG (*Chem. Ztg., 34 (1910), No. 130, p. 1158; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 22, p. 1303*).—As attempts have often been made without success to use a nitric-acid solution of ammonium molybdate for detecting inorganic phosphates in plant and animal tissues, the author tried the following experiment: "A gelatin emulsion of tricalcium phosphate was poured into a test-tube, and after it had solidified, several cc. of the molybdate reagent were poured on top. At the surface of the gelatin a yellow skin of ammonium phospho-molybdate was formed, which after an hour was so firm that the underlying gelatin could be melted without destroying it. No trace of the precipitate could be seen in the gelatin. Though penetrable by phosphoric acid and nitric acid, the gelatin was impermeable to the molybdate. The nitric acid, indeed, in one case, had penetrated 20 mm. deep into the gelatin within an hour. The molybdate reagent is therefore useless for the recognition of phosphates locally."

The quantitative estimation of sulphur and phosphorus, C. G. L. WOLF and E. ÖSTERBERG (*Biochem. Ztschr., 29 (1910), No. 6, pp. 429–438*).—A description of a method for estimating sulphur and phosphorus in the same solution in biological products, and which, according to the authors, is as exact as either the sodium peroxid method (E. S. R., 16, p. 639), or the Neumann method [a] (E. S.

[a] Ztschr. Physiol. Chem., 43 (1904), No. 1–2, pp. 32–36, fig. 1.

R., 20, p. 113). The method is based upon the preliminary oxidation of the substance with fuming nitric acid and the further oxidation with copper nitrate and potassium chlorate.[a]

Volumetric method for free sulphuric acid and sulphates, F. REPITON (*Monit. Sci., 4. ser., 24 (1910), I, No. 822, pp. 382–384; abs. in Ztschr. Angew. Chem., 23 (1910), No. 40, p. 1912*).—The sulphuric acid is precipitated with a barium chlorid solution of known strength, and the excess of the latter removed with a solution of potassium bichromate of known titer. The amount of this bichromate employed is determined with stannous chlorid and with the aid of mercuric chlorid as the indicator.

The use of phenol for determining calcium and magnesium, L. LINDET and BRASART (*Ann. Chim. Analyt., 15 (1910), No. 8, pp. 293–295*).—Essentially this method has been already noted from another source (E. S. R., 23, p. 705).

A practical manual for the analysis of soils, F. HITI (*Estac. Agr. Cent. [Mexico] Bol. 26, pp. 56, pls. 3*).—Methods for the approximate and complete analysis of soils are summarized.

The determination of formic acid in the presence of acetic acid, M. H. DELEHAYE (*Ann. Falsif., 3 (1910), No. 23, pp. 386–388*).—The method is based on the reduction of mercuric sulphate to insoluble mercurous sulphate.

Preservatives in fruit juices, with particular reference to detecting formic acid, LOOCK (*Ztschr. Öffentl. Chem., 16 (1910), No. 18, pp. 350–354*).—After reviewing the various preservatives utilized for conserving fruit juices, the author points out that formic acid is a normal constituent of fruits but that the amount contained therein is very limited. The various qualitative and quantitative methods for estimating this acid are then considered, and from his results it is concluded that not much reliance can be placed on the qualitative detection of formic acid on the basis of its reducing action in the aqueous distillate. A more exact method is, particularly for small amounts, by allowing sulphuric acid to act on the distillate residues which have been previously treated with lead oxid. This liberates carbon monoxid which is passed through defibrinated blood and the carbon monoxid hemoglobin spectrum noted therein.

Examination of honey, with particular reference to the Ley, Fiehe, and Jägerschmid reactions, F. REINHARDT (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 3, pp. 113–152*).—The author concludes from the results of his examination of various honeys that Ley's reaction is conclusive only when Fiehe's and Jägerschmid's reactions yield positive results. Fiehe's reaction is positive only when it yields the characteristic dark cherry-red coloration with both a 38 and 25 per cent hydrochloric acid-resorcin solution. Jägerschmid's reaction is positive when either a red or violet or a carmine-red color is produced, and always when Fiehe's reaction is obtained.

According to the author, a honey analysis should include the estimation of the water content, polarization of a 10 per cent solution before and after inversion, Fiehe's reaction, Jägerschmid's reaction, and tannin precipitation according to Lund. If Fiehe's and Jägerschmid's reactions are both positive it is then advisable to try Ley's reaction and make a determination of the ash.

The results of numerous analyses of honey are appended.

Tests in regard to the methods for estimating starch in table mustard, H. KREIS (*Chem. Ztg., 34 (1910), No. 115, pp. 1021–1023; abs. in Schweiz. Wchnschr. Chem. u. Pharm., 48 (1910), No. 52, pp. 793–795*).—The methods considered for this work were (a) hydrolyzing in the autoclave, saccharifying,

[a] Jour. Biol. Chem., 6 (1909), pp. 363–371.

and estimating the dextrose formed; (b) weighing the starch isolated according to Mayrhofer; (c) saccharifying the starch isolated according to Mayrhofer, and estimating the dextrose formed; and (d) estimating colorimetrically the starch in the solution.

After pointing out the various errors in the above methods, the author recommends the following, though not as absolutely correct: Five gm. of mustard are heated with 50 cc. of an 8 per cent alcoholic potassium hydrate solution in a flask connected with a reflux condenser and on a water bath for one hour. The solution is diluted with 50 cc. of a 50 per cent solution of alcohol, filtered hot through a Gooch crucible, and the residue in the crucible washed with 50 per cent alcohol. The contents of the crucible are then brought back into the extracting flask and extracted for one hour with 50 cc. of an aqueous normal solution of potassium hydrate. The solution is brought up to a bulk of 250 cc., and filtered through asbestos. To 50 cc. of the filtrate 50 cc. of 95 per cent alcohol is added, the mixture allowed to stand over night, then centrifuged, and the supernatant clear fluid passed through a Gooch crucible. After this the residue is brought upon the Gooch filter and washed with 95 per cent alcohol (by volume) and ether, dried to constant weight, and the weight recorded. The contents of the crucible are then ashed.

The results are reported in percentages of ash and water-free starch on the basis of dry substance. The author recommends applying a correction of 3 per cent for apparent starch.

On the determination of aldehydes in distilled liquors, M. Vivencio del Rosario (*Philippine Jour. Sci., A. Chem. and Geol. Sci., 5 (1910), No. 1, pp. 29–32*).—As the official method for aldehyde in distilled liquors did not yield satisfactory results, particularly in a tropical climate, the author modified the Ripper method (E. S. R., 13, p. 524), with which more accurate results could be obtained.

The detection and determination of manganese in wines, Dumitrescou and E. Nicolau (*Ann. Falsif., 3 (1910), No. 24, pp. 407–410*).—White, red, and dark red wines contain manganese as a natural constituent. The amount is very variable and is always directly dependent upon the amount present in the soil in which the grapes are grown. The manganese can be determined with ammonium persulphate by oxidizing it to permanganate (E. S. R., 24, p. 211).

Identification of food colors, H. M. Loomis (*U. S. Dept. Agr., Bur. Chem. Circ. 63, pp. 69*).—This is a tentative report on certain colors, and has to do with their solubility and extraction and the color reactions of dyed fiber and of aqueous and sulphuric acid solutions of colors. It is virtually a revised edition, with some additions to bring it up to date, of Circular 25 (E. S. R., 17, p. 788) and Circular 35 (E. S. R., 19, p. 306).

Unification of analytical methods for the sugar industry in Germany (*Bul. Assoc. Chim. Sucr. et Distill., 28 (1910), No. 4, pp. 239–254; Ztschr. Ver. Deut. Zuckerindus., 1910, No. 657, II, pp. 1004–1028*).—A detailed description of the proposed methods.

Method for determining saccharose polarimetrically and directly and in the presence of reducing sugars, P. Lemeland (*Jour. Pharm. et Chim., 7. ser., 2 (1910), No. 7, pp. 298–308*).—The method is based on the use of manganese dioxid, hydrogen peroxid, and sodium hydrate for breaking down the reducing sugars in the presence of saccharose.

About the use of the refractometer for the analysis of the products of the sugar cane, F. Zerban (*Rev. Indus. y Agr. Tucumán [Argentina], 1 (1910), No. 2, pp. 33–36*).—A discussion in regard to the use of the refractometer in sugar analysis.

A polariscopic method for the determination of malic acid and its application in cane and maple products, P. A. YODER (*Abs. in Science, n. ser., 32 (1910), No. 823, p. 478*).—"Making use of the fact that uranyl compounds cause a manifold increase in the optical activity of active dicarboxylic hydroxy acids, the author has developed from extensive original data a method of estimating malic acid in solutions which may at the same time contain a wide range of other substances."

Report on the progress of the chemistry of milk and dairy products for the first half year of 1910, GRIMMER (*Milchw. Zentbl., 6 (1910), No. 8, pp. 337–352*).—This is a retrospect of the progress made in the field of the chemistry of milk and dairy products.

Methods for detecting heated milk in dairy products, particularly in butter, HESSE and D. W. KOOPER (*Milchw. Zentbl., 6 (1910), No. 9, pp. 412–420*).—The results show that the most sensitive reagents are Storch's paraphenylendiamin (E. S. R., 10, p. 384), and the guaiacol-paraphenylendiamin tests (E. S. R., 20, p. 1107), preference being given to the latter. See also the work of Wilkinson and Peters (E. S. R., 20, p. 1108).

Detecting milk which has been heated, HESSE (*Molk. Ztg. [Hildesheim], 24 (1910), No. 99, pp. 1857, 1858*).—Noted above from another source.

The refractometry of the chlorid of calcium serum of milk from individual cows, C. MAI and S. ROTHENFUSSER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 1, pp. 23–37; Molk. Ztg. Berlin, 21 (1911), Nos. 5, pp. 50, 51; 6, pp. 62–64*).—As a result of examining the milk of individual cows by this method (E. S. R., 23, p. 309) the authors conclude that it is without doubt an accurate means for detecting added water to milk, even where the milk itself undergoes natural variations in its composition.

In regard to the refractometry of calcium chlorid milk serum, G. FENDLER, C. BORKEL and W. HEIDEMEISTER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 3, pp. 156–169; abs. in Chem. Ztg., 34 (1910), No. 145, Repert., p. 598*).—The authors deduce from their results of the examination of a large number of milk samples for the refraction and specific gravity of the calcium chlorid milk serum that no relation seems to exist between these constants nor between either one of them to the fat-free dry substance of the milk. See also a previous note by Mai and Rothenfusser (E. S. R., 23, p. 309).

Detection of peanut oil in cotton-seed and other oils, S. FACHINI and G. DORIA (*Abs. in Chem. Ztg., 34 (1910), No. 112, p. 994*).—The method differs from that of Tortelli and Ruggeri (E. S. R., 11, p. 23) in that acetone is employed instead of ethyl alcohol for removing the arachidic acid and the soluble and insoluble fatty acids. Acetone has several advantages, which are stated.

Quantitative determination of water in pastes, semipastes, and mixed paints, L. P. NEMZEK (*North Dakota Sta. Spec. Bul. 28, pp. 254, 255*).—A method is described which differs from the one generally used for this purpose, inasmuch as it requires less time for its execution and determines only the free water incorporated in the paint without that in combination with the color. See also a note by Sadtler (E. S. R., 23, p. 112).

The method is conducted as follows: "Weigh 100 gm. of the thoroughly mixed sample into a 250 cc. Erlenmeyer or side-neck distilling flask. Add about 90 cc. of toluol previously dried with calcium chlorid. Shake gently until a uniform mixture is obtained. Distill over 60 to 75 cc. into a suitable graduate. The percentage of water, if there be any present, can be read direct from the graduate. For convenience and accuracy the graduate should be calibrated to tenth of cubic centimeters. The determination should be made at 95 to

100° C. Seldom is it necessary to exceed 115°. Care must be exercised in heating. A naked flame, oil bath, or air bath may be used. The latter has given the best results, as the temperature obtained is uniform and steady."

"Out of 96 analyses made of the vehicle in mixed paints fully 50 per cent were found to contain water. Sixteen paints [E. S. R., 22, p. 710] contained water ranging from 5.24 to 39.51 per cent of the vehicle proportion of the paint."

Rubber and its examination, F. W. Hinrichsen and K. Memmler (*Der Kautschuk und seine Prüfung. Leipsic, 1910, pp. X+263, figs. 64*).—This book deals with the history, geographical distribution, and chemical and physical properties of crude and refined rubber and its products, and their chemical examination.

A critical investigation of the analytical methods for crude rubber, O. Korneck (*Gummi Ztg., 25 (1910), Nos. 1, pp. 4–9; 2, pp. 42–46; 3, pp. 77–88*).—An investigation and analytical discussion of these methods.

The preparation of cider, F. Porchet (*Terre Vaud., 2 (1910), Nos. 40, pp. 428–430; 42, pp. 451, 452; 43, pp. 462–464*).—A description of the methods employed for producing cider and the changes therein, with a discussion of the diseases attacking this beverage.

Conserving plums (reineclaude) and peaches in vinegar (*Deut. Essigindus., 14 (1910), No. 37, pp. 268, 269*).—A description of a practical method for this.

Tomato ketchup under the microscope, B. J. Howard (*U. S. Dept. Agr., Bur. Chem. Circ. 68, pp. 14*).—This circular was written for the purpose of giving the ketchup manufacturer the benefit of some practical results obtained from laboratory and factory investigations of the various methods of handling tomato products. While it gives some attention to microscopical methods for estimating molds, yeasts, spores, and bacteria, and the apparatus required for this, it especially discusses the reasons for the spoilage of tomato ketchup, such as defective hygienic methods, the poor condition of the fruit, and unsanitary methods of handling it, these being illustrated with some practical examples taken from actual factory practice.

The manufacture and use of dried potato products, E. Parow (*Pure Products, 6 (1910), No. 8, pp. 454–456, figs. 3*).—This includes a discussion of the purposes and economic value of the industry, the manufacture and the uses of dried potatoes, the systems of potato drying, and the keeping quality of the dried product. This article has particular reference to German conditions.

Beef fats, W. B. Allbright (*Nat. Provisioner, 43 (1910), No. 17, pp. 82–85, figs. 7; Butchers' Advocate, 49 (1910), No. 26, pp. 23, 25, 27*).—This article describes chiefly the process employed for rendering beef fats for the purpose of producing oleo oil and stearin.

The production of vegetable butter in Germany (*Jour. Roy. Soc. Arts, 58 (1910), No. 3006, pp. 760, 761*).—A brief general description of the preparation of oil from copra (E. S. R., 22, p. 145; 24, p. 213), with particular reference to its use for the manufacture of vegetable butter and soap. Attention is called to the fact that copra products are supplanting American cotton-seed oil.

The manufacture of castor oil, G. Gomez (*Estac. Agr. Cent. [Mexico] Bol, 28, pp. 28, pls. 4*).—A description of the methods of producing castor oil in Mexico.

Waterproof liquid from soy-bean oil, A. A. Williamson (*Daily Cons. and Trade Rpts. [U. S.], 13 (1910), No. 104, p. 448*).—This is a new use for soy-bean oil as a material for preparing a waterproof liquid with greater durability and at less cost than other available materials.

A calculating card for hydromel (honey mead) manufacture, E. Cabasse (*Apiculteur, 54 (1910), No. 6, pp. 236–240, fig. 1*).—A card is described with which it is possible to make rapidly the more important calculations required in the honey mead industry.

The manufacture of cane sugar, L. Jones and F. I. Scard (*London, 1909, pp. XIX+454, pl. 1, figs. 244*).—This publication is intended as a guide for those who are connected directly or indirectly with the cane-sugar industry, otherwise than in a technical capacity. It treats of the botany, chemistry, and diseases of sugar: the crushing of the canes and extraction of the juice; accessories and their functions; multiple mills, their work and arrangement; clarification, filtration, and concentration of the juice; crystallization; purification of the sugar crystals; scientific control of the factory; steam generation; and the by-products of sugar.

The manufacture of milk sugar from whey, T. Aufsberg (*Chem. Ztg., 34 (1910), No. 99, p. 885*).—A description of a process in which the whey is concentrated in vacuum pans, and the sugar allowed to crystallize, removed with a centrifuge, and purified. The second mother liquors may be utilized as a fertilizer, for producing lactic acid, or for a conserve simulating meat extract.

Production of casein in Russia, J. H. Grout (*Daily Cons. and Trade Rpts. [U. S.] n. ser., 1 (1910), No. 49, p. 653*).—A description of the method of separating casein from skim milk, its market value, and the present status of the industry.

The significance of fluorin compounds for the preservation of wood, J. Netzsch (*Naturw. Ztschr. Forst u. Landw., 8 (1910), No. 8, pp. 377–389*).—This is a study of the antiseptic action of the various fluorids for wood preservation, particularly the relation of this action to the chemical composition of the various fluorids. The tests were conducted chiefly with *Coniophora cerebella* and the following fluorin compounds: Simple fluorids, acid fluorids, the silicates, titanates, and the cryolith-like fluorin combinations.

How wood is artificially aged, H. Wislicenus (*Ztschr. Angew. Chem., 23 (1910), No. 31, pp. 1441–1446; Sci. Amer. Sup., 70 (1910), No. 1815, pp. 250, 251*).—After discussing the various methods for artificially aging wood, the author describes a method for the humin coloring of wood by soil gases which he considers a decided improvement over previous methods.

Industrial alcohol: Sources and manufacture, H. W. Wiley, revised by H. E. Sawyer (*U. S. Dept. Agr., Farmers' Bul. 429, pp. 32, figs. 3*).—This is a revised edition of Farmers' Bulletin 268 (E. S. R., 18, p. 684), and embodies in nontechnical language much of the matter previously noted in Bulletin 130 of the Bureau of Chemistry (E. S. R., 22, p. 516). The conclusions drawn are the following:

"It is apparent that the business of distilling alcohol is one which calls for a considerable investment and no small degree of technical skill. It can not be conducted advantageously, from a commercial point of view, in very small plants on account of the proportionately high cost of the plant and of labor; and many of the so-called 'wastes' which have been suggested as fermentable raw materials are so poor in fermentable substance or so expensive to handle that their availability is thereby impaired. It seems that the business, to be productive of satisfactory returns, must be conducted on a fairly large scale, and that the best success is likely to be attained with raw materials of the general types already in use, namely, maize, potatoes, and molasses. The industry is not suited to every locality, and it is most likely to be successful if carried on systematically on a very large farm, or if supported by the joint interests of a fairly large community. The alluring statements sometimes made regarding large financial returns to be obtained by making industrial alcohol with waste raw material, unskilled labor, and a 'cheap' distilling outfit are misleading and can only result in loss if followed."

METEOROLOGY—WATER.

Agricultural meteorology, G. COSTANZO and C. NEGRO (*Meteorologia Agricola. Milan, 1911, pp. XI+205, figs. 27*).—Different chapters of this book treat of the air, temperature and its distribution, aqueous vapor, condensation, precipitation, atmospheric pressure, winds, atmospheric circulation, storms, atmospheric electricity, and plant life and meteorological factors. A short bibliography is given.

Meteorological conditions and their effect on agriculture in Cuba, 1910, L. G. Y CARBONELL (*Bol. Ofic. Sec. Agr. Cuba, 10 (1911), No. 2, pp. 167–189, pls. 2*).—Summaries of observations on pressure, temperature, and precipitation in different parts of Cuba are accompanied by a brief discussion of the effect of the meteorological conditions on the growth of crops.

Meteorological observations at the Massachusetts Agricultural Experiment Station, J. E. OSTRANDER and C. M. DAMON (*Massachusetts Sta. Met. Buls. 265, 266, pp. 4 each*).—Summaries of observations at Amherst, Mass., on pressure, temperature, humidity, precipitation, wind, sunshine, cloudiness, and casual phenomena during January and February, 1911. The data are briefly discussed in general notes on the weather of each month.

Water supply (*Surveyor, 39 (1911), No. 993, pp. 116–121*).—The progress in work on this subject during 1910 is reviewed, advances in legislation, construction, and water purification being noted.

The conservation of water, J. L. MATHEWS (*Boston, 1910, pp. VIII+289, pls. 32*).—Different chapters of this book discuss in a popular way water as a resource, floods and flood prevention, storage, municipal supply and the purification of rivers, water power—the mining of the "white coal," water power in national development, swamp drainage, irrigation, conservation of the soil, navigation, and the results of the conservation of water.

The fundamental idea underlying the treatise is that "water power, irrigation, swamp drainage, navigation, and soil preservation—these, with forestry, are the great profit makers for the Nation in the conservation of water," and water resources should be under strict governmental control in order to secure the greatest beneficial use.

A study of the normal constituents of the potable water of the San Francisco peninsula, J. P. MITCHELL (*Leland Stanford Jr. Univ. Pubs., Univ. Ser., 1910, No. 3, pp. 70, map 1*).—The investigations here reported are an extension of a preliminary survey of the waters of the eastern hydrographic basin of the San Francisco peninsula, by D. M. Greer, and were undertaken "to determine the normal constituents of the potable water of the San Francisco peninsula, from a sanitary point of view, and before the growth in the population affects too seriously the natural purity of the water supplies. The significant constituents, and the interpretation of water analyses, are discussed briefly. The area studied included approximately 675 square miles lying south of Baden station on both sides of the peninsula. This was divided into 26 subdivisions, 13 on each side. The characteristic topographical and climatological features of the region are described in detail. Especial emphasis is laid on the distribution of the rainfall, the presence of the strong ocean 'trade winds,' both of which are peculiarly characteristic of the Pacific coast of California, and on the resulting, very marked, seasonal variation in the constituents of all the waters."

The results of a personal survey of each watershed, as well as of determinations of turbidity, sediment, color, odor, loss on ignition, free and albuminoid ammonia, nitrates, and nitrites in 240 samples of stream, spring, and reservoir waters from 126 localities, and of 15 samples of deep well water, are reported and discussed. A study was also made of the chlorin content of 103 of these samples for the purpose of determining the normal chlorin content of the waters of the peninsula.

There were wide seasonal variations in free and albuminoid ammonia. Nitrites were generally absent, especially in the spring and fall months. The maximum observed during the winter was 0.003 part per million for streams and 0.006 for reservoirs. Nitrates were rarely found.

In connection with the determination of the nitrate content a study was made of the efficiency of the phenolsulphonic acid and the reduction methods, from which the conclusion was drawn that "for waters containing large amounts of chlorids the nitrogen present as nitrate may best be determined by the 'reduction method,' using the copper-zinc couple and oxalic acid. If the result of the determination indicates a nitrogen content in excess of 5 parts per million, the determination should be repeated, using the phenolsulphonic-acid method, and standards prepared according to Mason's suggestion. With low nitrates the error may be as much as 10 per cent, with 20 parts per million or over the error should not exceed 3 per cent."

An exceedingly high chlorin content was observed in the waters as compared with those of the Eastern States. The normal values ranged from 10 to 50 parts per million. "This high chlorid content is characteristic of the waters of the Pacific coast, and is due to the influence of two factors, namely, the rainfall and the ocean winds." The results of the chlorin determinations are mapped and "isochlors" are drawn.

The waters are all very hard, as much as 250 parts per million in streams and 150 in reservoirs being frequently observed. Temporary hardness varies from 150 to 250 parts per million in streams and from 40 to 120 parts in reservoirs.

The sterilization of waters by ultraviolet rays (*Bul. Off. Internat. Hyg. Pub.* [*Paris*], *2* (*1910*), *No. 7, pp. 1062–1078, figs. 4*).—Brief accounts are given in this article of the various methods and processes which have been proposed for this purpose.

Sewage disposal, L. P. KINNICUTT, C. E. A. WINSLOW, and R. W. PRATT (*New York and London, 1910, pp. XXVI+436, figs. 113; rev. in Science, n. ser., 33* (*1911*), *No. 841, pp. 222, 223*).—This book attempts to discuss somewhat fully the fundamental principles of chemistry and bacteriology involved in sewage treatment, including also the more important engineering aspects of sewage disposal works.

"It is hoped that the book may be useful to the student of sanitary engineering who aims to fit himself for the construction of sewage disposal works, to the engineer who after working in other lines is drawn into this growing field, and to the chemist, the bacteriologist, and the public health official concerned in the operation of disposal works after they are built."

The chapters of special agricultural interest are those relating to disposal of sewage sludge and purification of sewage by broad irrigation and sewage farming.

The authors accept the British Commission's conclusions as to the low fertilizing value of sludge. Sewage farming is considered practicable under certain conditions, particularly where rainfall is light and a sufficient area of light sandy soil is available. The difficulty in the way of using this method is increased in the United States on account of the excessive use of water and the resulting large volume and diluted character of the sewage. The authors are of the opinion that the tendency is away from the use of this method even in those countries where it has heretofore been most successfully employed.

Sewage disposal, E. D. WALKER (*Engineer* [*Penn. State Col.*], *3* (*1910*), *No. 4, pp. 193–203*).—This article discusses among other methods sewage irrigation. It is pointed out that this method is fairly successful where the soil is sandy and the climate and crops are such that some part of the farm is ready to receive sewage at all seasons. It is one of the oldest methods of sewage disposal and has been developed especially in England, Germany, and France. It has been used for over three centuries at Bunzlau, Germany.

"The farms at Berlin and Paris which are so often quoted have about reached their limit as to the amounts of sewage to be handled, and it is the opinion of many engineers of prominence who are familiar with the local conditions that the day is not far distant when these farms will be discontinued and some of the more modern biological processes adopted instead."

Sewage irrigation has been tried to some extent in the United States, but has generally been abandoned in favor of other methods except in arid regions where water is especially valuable for farming purposes. Under favorable conditions of soil and climate from 2,000 to 10,000 gal. of raw sewage per acre daily can be taken care of by this method.

The laying out and operation of sewage irrigation fields, R. HAUPTNER (*Tech. Bl. Vrtljschr. Deut. Polytech. Ver. Böhmen*, *32* (*1910*), *No. 3, pp. 11, figs. 5*; *abs. in Wasser u. Abwasser*, *3* (*1911*), *No. 10, pp. 428, 429*).—This article deals with the suitability of different kinds of soil for sewage irrigation, the crops that may be grown most profitably, the amount of sewage that may be handled, and the cost of sewage irrigation.

The agricultural utilization of sewage and food hygiene, P. REMLINGER and O. NOURI (*Hyg. Gén. et Appl.*, *1910*, *pp. 421–426*; *abs. in Wasser u. Abwasser*, *3* (*1911*), *No. 11, p. 455*; *Rev. Hyg. et Pol. Sanit.*, *33* (*1911*), *No. 2, pp. 169, 170*).—Investigations on the danger of transmission of disease germs through vegetables grown on sewage irrigation farms are reported, indicating that the danger from this source is probably exaggerated. The results showed that none of the various pathogenic organisms experimented with was taken up internally by the plants, and that the only possible source of danger was from organisms adhering to their surface. It was found that the only organisms which were retained by plants grown under conditions similar to those on well managed sewage irrigation farms were charbon and tetanus, but, as the authors point out, the bacillus of charbon is very rare in sewage water and the ingestion of the tetanus bacillus is harmless.

SOILS—FERTILIZERS.

Soil valuation on an agronomic-scientific basis, O. BAUER (*Bonitierungsversuch auf Agronomisch-naturwissenschaftlicher Grundlage. Inaug. Diss. Tech. Hochschule München*, *1909*, *pp. 100, pls. 3*; *abs. in Zentbl. Agr. Chem.*, *39* (*1910*), *No. 8, pp. 503–506*).—This dissertation gives the methods and results of studies of the topographic, geological, and agricultural conditions of three districts, as well as mechanical analyses and determinations of the calcium carbonate, water capacity, and coherence of the soils. On the basis of the data so obtained the author classifies the soils for scientific and valuation purposes, attempting to correlate the results of the various observations and determinations with the agricultural qualities of the soils.

Publications of the Bureau of Soils (*U. S. Dept. Agr., Div. Pubs. Circ. 14, pp. 6*).—This is a list of publications of the Bureau of Soils on hand for free distribution in the Division of Publications March 7, 1911.

Chemical and mechanical analyses of characteristic Idaho soils, J. S. JONES (*Idaho Sta. Bul. 68, pp. 33*).—Continuing earlier work (E. S. R., 13,

p. 432) this bulletin reports detailed analyses of samples representative of districts in the semiarid and humid sections of Idaho, and discusses these analyses with reference to the requirements of soils in fertilizing constituents.

"As a rule the soils of the State are rich in all of the mineral elements required in plant growth. Certain districts in the south, however, are apparently deficient in phosphoric acid. Four-tenths per cent is the lowest and 0.70 per cent the highest amount of phosphoric acid found in samples from the south. The average is 0.19 per cent, which is far above the lower limits of adequacy. In the north this compound is more evenly distributed; the lowest amount found is 0.09 per cent, the highest 0.56 per cent, average 0.25 per cent. The timber soils of the north appear to be exceptionally well supplied with phosphoric acid. In potash the soils from the south are somewhat, in lime they are decidedly, richer than those from the north. Discarding samples which are known to represent abnormal soils, the average potash and lime content of samples from the south is 0.61 per cent and 1.90 per cent, respectively; that of samples from the north, 0.50 per cent and 0.72 per cent, respectively. Certain districts in the north contain too little lime in the form of a carbonate and as a result the soils are slightly acid. This condition should be improved by the application of finely crushed limestone. In humus and nitrogen large areas in the south and much of the burned over timber soils of the north are deficient."

Analysis of Tamana soils, J. de Verteuil (*Bul. Dept. Agr. Trinidad, 9 (1910), No. 66, pp. 237–239*).—An examination of 5 soil types from places where native plants were dying showed that the surface soil to a depth of 3 ft. contained an excess of magnesia over lime, although the subsoil contained an abundance of calcareous material.

Analyses of soils of Campinas, Brazil, J. Arthaud-Berthet and E. Sixt (*Bol. Inst. Agron. [São Paulo], 1909, Nos. 9, pp. 189–193, dgm. 1: 10, pp. 240–247; 11, pp. 314–327*).—This article contains results of chemical and physical analyses of a number of different kinds of soils from this region, and discusses the bearing of physical and chemical factors upon the fertility of the soils.

Characteristic soils of the Habis region in southwest Africa, Gruner (*Tropenpflanzer, 14 (1910), No. 12, pp. 634–641*).—The so-called red soil lying north and west of Habis is described as a slightly humus, gravelly, loamy sand about one meter in depth, containing a slight excess of iron.

Mechanical analysis showed 5.81 per cent of gravel, 73.5 per cent of sand, and 20.31 per cent of clay. Chemical analysis showed a small amount of phosphoric acid (0.031 per cent), a low humus content (0.339 per cent), low nitrogen (0.099 per cent), a moderate amount of lime (0.294 per cent), and an abundance of potash (0.407 per cent). Of the nitrogen over half (0.057 per cent) was in the form of nitrate. The soil east of Habis was found to be very low in phosphoric acid (0.016 per cent), nitrogen (0.066 per cent), and potash (0.014 per cent), and high in lime (15.115 per cent) and magnesia (6.476 per cent), showing a composition which makes it of little agricultural value as compared with the red soil referred to above.

Soils of New South Wales, II, H. I. Jensen (*Agr. Gaz. N. S. Wales, 21 (1910), No. 12, pp. 1036–1055, map 1*).—This article deals with soils of the North Coast of New South Wales, including the Manning-Macleay and northern rivers drainage areas. The physiography of these areas and the general agricultural value of the soils are discussed, and a considerable number of analyses of samples of typical soils are reported.

The areas contain soils derived from Paleozoic, metamorphic, Carboniferous and Permo-Carboniferous, and volcanic rocks, and from alluvial formations.

The types are quite similar in the two areas, although as a result of the greater rainfall and somewhat different character of the formations in the northern rivers regions the soils of this area have been leached out to a greater extent. Nevertheless, the soils of this area are much more productive than those of the Manning-Macleay district.

An average of 294 analyses of North Coast soils shows nitrogen 0.256, phosphoric acid 0.178, potash 0.086, and lime 0.173 per cent. The soils vary in composition with the formations from which they are derived. The formations yielding very poor soils are the sandstones and quartz schists, those giving medium class soils are the granites, shales, and slates, and those giving good soils are the limestone, basalt, and alluvial formations. The limestone soils are as a rule of fine quality, and the volcanic soils are very fertile. The serpentine soils, however, are not so fertile as their chemical composition would indicate. The unproductiveness of certain of the soils is attributed to the presence of unusual amounts of manganese and magnesia.

The soils are mapped with reference to relative productiveness.

The chemical nature of the black-soil plains, F. B. Guthrie and H. I. Jensen (*Agr. Gaz. N. S. Wales, 21 (1910), No. 10, pp. 855–860*).—It has been suggested that these black soils, occurring in the northwestern part of New South Wales, are of volcanic origin, but the authors are of the opinion that they are of alluvial origin. They include some of the richest grazing lands of the State, and a study of their chemical and physical properties shows that they are as a rule stiff clay soils of low capillary power and highly retentive of water, becoming very sticky when wet and very hard and cracked when dry. They are not rich in organic matter and are invariably low in nitrogen, but they are rich in mineral plant food, particularly lime and potash. The soils are usually slightly alkaline in nature.

The average percentage of nitrogen in 10 samples of these soils was 0.089, phosphoric acid 0.179, potash 0.337, and lime 0.666. The volatile matter amounted to 7.4 per cent, and water to 6.7 per cent. Four physiographic classes of black soils are described.

The relation of vegetation to water extracts from the soils of Atbasar District, Akmolinsk, G. Tumin (*Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 5, pp. 704–718*).—Water extracts from different depths of soils were analyzed to determine the percentages of dry matter, chlorin, sulphuric acid, and alkalinity in a region the annual rainfall of which is 200 mm.

The data obtained show that the concentration of the soil extract varied for the different depths of soil. Plants endured a higher degree of concentration of soil solution in the deeper layers of soil than in the surface soil. Not only calcium sulphate but also calcium carbonate enabled the plants to endure stronger concentrations of soil solutions. At the same time the author does not believe that the greater resistance of plants to concentration of solutions in the deeper layers of soil is dependent alone upon the amounts of calcium sulphate and calcium carbonate present in such layers of soil, but that the plants themselves play an important part in this respect.

Physical and chemical processes in soil formation in the Tropics, P. Vageler (*Fühling's Landw. Ztg., 59 (1910), No. 24, pp. 873–880; abs. in Chem. Ztg., 34 (1910), No. 114, pp. 1014, 1015*).—This is a paper presented at the meeting of German Naturalists and Physicians at Königsberg.

It is stated that laterite or, more properly, red soils are typical of the Tropics. These soils are as a rule poor in plant food. Various hypotheses have been advanced as to the mode of formation of these soils, but the author attempts an explanation from the standpoint of colloid chemistry. The principal colloids involved in the process of formation are silicic acid, iron oxid, and aluminum hydroxid. The silicic acid in the presence of a basic reaction of the soil, which results from a deficiency of organic matter under the influence of the laterite decomposition and high temperature of the soil, is unusually stable and does not undergo coagulation, but is washed out with water along with the alkalis. On the other hand, the aluminum hydroxid and ferric oxid are very unstable under these conditions and are quickly coagulated and thus fixed in the soil. The determining factors, therefore, in the formation of laterite soils under tropical climatic conditions are high temperature and rapid decomposition of the organic matter.

The condensation of water vapor in the soil, E. MARCHENKO (*Dnevn. XII. S''íêzda Russ. Est.-Isp. i Vrach.* [*Moscow*], *1910, No. 8, pp. 340, 341; abs. in Geol. Zentbl., 14 (1910), No. 8, p. 512; Wasser u. Abwasser, 3 (1910), No. 6, p. 235*).—The author maintains that water vapor may be condensed to ground water in the soil.

Influence of woods on the temperature of the soil and subsoil, N. NESTEROV (*Líêsoprom. Víêstnik, 1909, No. 16, pp. 153–158; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 3, p. 408*).—Observations on the temperature of the water in wells bored in woods and in clearings at the Moscow Agricultural Institute showed that (1) the temperature of the subsoil under the forest was throughout the entire year lower than under the open ground, (2) the influence of the forest in lowering the temperature of the subsoil was noticeable to a depth of 10 meters, (3) the rate of cooling of the subsoil was slower under the forest than outside of the forest, and (4) on a new clearing the subsoil warmed up during the summer to a depth of only 3 meters, reaching a temperature corresponding to that of open land.

The relation of colloidal silica to certain impermeable soils, K. F. KELLERMAN (*Science, n. ser., 33 (1911), No. 840, pp. 189, 190*).—Investigations are briefly reported which indicate that the impermeability of certain soils of the Truckee-Carson Irrigation Project is due to the presence of considerable amounts of colloidal silica. The addition of calcium sulphate improved the permeability of the soils, apparently by coagulating the colloidal silica.

The rôle of mica in cultivated soil (*Rev. Sci.* [*Paris*], *49 (1911), I, No. 3, p. 83*).—The investigations of Prianishnikov (E. S. R., 17, p. 842) and Biéler-Chatelan (E. S. R., 23, p. 715) are briefly noted as showing that mica (muscovite) is capable of furnishing more potash to plants than feldspar (orthoclase). This is attributed to the higher solubility of the former mineral, the solubility being increased by the use of gypsum, peat, ammonium sulphate, quicklime, monocalcium phosphate, and other substances.

Increase in nitrates in limed as compared with unlimed soils, J. DE VERTEUIL (*Bul. Dept. Agr. Trinidad, 9 (1910), No. 66, pp. 239, 240*).—Examination of two limed soils showed a striking increase in percentage of nitrates over the unlimed soils.

On the action of crushed quartz upon nitrate solutions, H. E. PATTEN (*Jour. Phys. Chem., 14 (1910), No. 7, pp. 612–619, fig. 1; abs. in Chem. Abs., 5 (1911), No. 2, p. 345*).—Experiments are reported which indicate that silver nitrate is reduced to a slight extent by filtration through pure sterile quartz, but that nitrate of soda is not so reduced. It is therefore concluded that the reduction of nitrate which occurs in the soil is probably due to bacterial agencies and to inorganic and organic chemical reactions rather than to the catalytic surface effect of the soil grains.

Investigations and observations on the behavior of different kinds of humus, C. EMEIS (*Allg. Forst u. Jagd Ztg., 86 (1910), Dec., pp. 425–432*).—This article briefly reviews investigations on the formation of nitrates and of so-called humus acids and their combinations with the mineral constituents of the soil, and reports observations which show that freshly fallen leaves and other plant remains are better sources of plant food than the older humus, which is almost incapable of further oxidation and is therefore practically inert.

It is stated that humic acids are present in the freshly fallen leaves and are leached out into the soil by rains. The amount of such compounds found in the leaves varied with the kind of trees, being much larger in beech leaves than in oak and ash leaves. Clay loams appear to be able to fix and neutralize humus acids in the soil, forming the so-called mild humus, which increases the productiveness, and to change the acids into carbon dioxid, which has a high solvent power for the mineral plant foods. Conditions which favor aeration and oxidation promote the productiveness of humus soils.

On the occurrence of Azotobacter in peat soil, H. von Feilitzen (*Svenska Mosskulturför. Tidskr., 25 (1911), No. 1, pp. 53–57*).—Azotobacter was found to occur to only a very limited extent in the peat soils of the Torestorp and Flahult substations, even in the best soils that had been under cultivation for nearly 25 years. No connection could be traced between its presence and the lime content of the soil.

The part played by micro-organisms other than bacteria in determining soil fertility, E. J. Russell and H. B. Hutchinson (*Chem. News, 102 (1910), No. 2656, pp. 202, 203; abs. in Chem. Abs., 5 (1911), No. 6, p. 1148*).—This article briefly reviews the indirect evidence tending to show that protozoa injuriously affect the bacteria which produce ammonia in the soil. It is stated that "direct evidence has not yet been satisfactorily obtained."

Methods of improving sandy soils, S. Bogdanov (*Khozīaistvo, 1909, Nos. 37, 41, 42; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 3, p. 415*).—Two means of improving sandy soils, viz, use of manure and green manuring with lupines, are discussed in detail.

The management of pineapple soils, W. P. Kelley (*Hawaii Sta. Press Bul. 29, pp. 10*).—This bulletin calls attention to the fact that the continued cultivation of pineapples on the same land has brought about unfavorable physical conditions which have greatly reduced the yield. The injury has been caused largely by cultivating the soils when wet. Methods of overcoming the unfavorable conditions by better tillage, the use of manure, and rotation are described.

The results of soil investigations as affecting the use of fertilizers, F. B. Carpenter (*Amer. Fert., 34 (1911), No. 1, pp. 15–20*).—This is an address delivered before the fertilizer division of the American Chemical Society at Minneapolis, December, 1910, and discusses particularly the bearing of recent soil investigations upon Liebig's theory relating to fertilizers as a source of plant food.

Fertilizing for profit, E. E. Miller (*Raleigh, N. C., 1910, pp. 106*).—This book attempts to explain briefly and plainly the fundamental facts underlying the use of fertilizers and to show the ordinary farmer how he can apply fertilizers so as to make better crops and build up the soil. It applies particularly to conditions in the South, where it is stated that the use of fertilizers is increasing faster than the average crop production per acre. "In other words, Southern farmers spend $50,000,000 a year for plant foods and then fail to improve their soils. This is true, not because commercial fertilizers are not good to use, but because they are used extravagantly and unwisely." This book was therefore written with the hope that it might point a way to a more judicious and profitable use of fertilizers.

The titles of the different chapters are: What fertilizers are and why used, what commercial fertilizers are, what nitrogen does and where we get it, about phosphoric acid, potash in commercial fertilizers, why fertilizers pay best on good soils, how to tell what fertilizer your soil needs, the special needs of different crops, what the analysis means, how to do home mixing, best methods of applying fertilizers, keeping up soil fertility, why green manures benefit the soil, when and how to use green manures, making and caring for stable manures, how and when to apply stable manure, and the profitable use of lime.

An appendix gives data on plant food in typical soils, what crops take from the soil, fertilizing materials in feeding stuffs, analyses of fertilizing materials, value of manure produced by live stock, composition of farm manures, and ten sample mixtures that farmers can make.

Farm fertilizers, S. A. KNAPP (*U. S. Dept. Agr., Bur. Plant Indus. Doc. 631, pp. 8*).—A popular discussion of the use of barnyard manure and commercial fertilizers.

Investigations of different bedding materials in the stable and their effect on the composition of the manure, on the changes during storage, and on its fertilizing value, H. VON FEILITZEN (*Svenska Mosskulturför. Tidskr., 25 (1911), No. 1, pp. 1–16*).—A résumé of investigations of these subjects by different authors, showing the great value of peat litter as an absorbent in the cow stable.

The nitrate of soda industry of Chile, MAIZIÈRES (*Engrais, 25 (1910), Nos. 48, pp. 1330–1333, dgms. 5; 49, pp. 1357–1359, dgms. 2; 50, pp. 1385–1387; 52, pp. 1440–1443, dgm. 1*).—This is a review of production and consumption of Chilean nitrate and a discussion of the present status and future outlook of the industry, based upon a report of the European representative of the Chilean government, which to a large extent is a plea for the reestablishment of the Nitrate Syndicate in Chile.

Outlook of Chilean nitrate business, A. A. WINSLOW (*Daily Cons. and Trade Rpts. [U. S.], 13 (1910), No. 127, p. 817*).—It is stated that the outlook for this industry seems good notwithstanding the low prices and the establishment of a number of new nitrate works. Data are given which show that the output and consumption in 1910 were much greater than in 1909. It is also shown that the consumption of nitrate in the United States has increased rapidly in recent years.

Nitrate industry of Chile, H. P. FLETCHER (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 7, p. 109*).—Upon the basis of a report of the bureau of manufactures of Chile it is stated that the estimated capacity of the nitrate fields of that country is 242,150,000 tons. The exports amounted to 2,319,571 tons in 1909, of which the United States took 503,889 tons. The estimated consumption of nitrate in the United States in 1910 was 639,949 tons.

[Production, exportation, and consumption of Chilean nitrate, 1910], E. FISHER (*Asoc. Sal. Propaganda, Circ. Trimest. 54, 1911, p. III*).—The total production for 1910, according to the official statement of the Nitrate of Soda Propaganda, is given as about 2,717,316 tons, an increase of 390,670 tons over the production for 1909. The exportation was 2,574,613 tons, an increase of 221,518 tons over 1909. The consumption was 2,600,747 tons, an increase of 345,472 tons over 1909.

Annual reports on nitrate of soda (*Mark Lane Express, 105 (1911), No. 4137, p. 37*).—From reports of several large dealers in nitrate of soda it is estimated that the total consumption of nitrate of soda in 1910 was 2,250,000 long tons, of which 1,531,000 tons went to the Continent of Europe, 120,000 tons to the United Kingdom, and 510,000 tons to the United States. The total consumption in 1909 was 1,938,000 tons, of which the Continent of Europe used 1,354,000 tons, the United Kingdom 111,000 tons, and the United States 407,000 tons.

Saltpeter, T. H. Holland and L. L. Fermor (*Rec. Geol. Survey India, 39 (1910), pp. 196–204*).—This article explains the conditions essential to the formation of saltpeter, describes the methods of manufacture followed in India, and gives statistics of distribution and export.

The nitrate is prepared by leaching the soil around villages and separating the sodium chlorid and potassium nitrate by fractional crystallization.

The average annual export during the 5 years 1903–4 to 1907–8 was about 20,103.38 tons valued at $1,285,904.75, the United States being one of the largest consumers. Calcutta is the chief port of shipment, handling over 98 per cent of the total product.

Saltpeter, T. H. D. La Touche (*Rec. Geol. Survey India, 40 (1910), pt. 2, p. 140*).—Statistics of export and distribution during 1908 and 1909 of saltpeter produced in India are given. It is shown that of the 22,676.98 tons of this material produced in 1909, 7,469.39 tons was sent to China, 4,709.38 to the United States, and 4,564.17 tons to the United Kingdom.

A contribution to the study of calcium cyanamid, C. Brioux (*Ann. Sci. Agron., 3. ser., 5 (1910), I, No. 4, pp. 241–281*).—This is a full account of investigations briefly reported elsewhere (E. S. R., 24, p. 323).

The author found that only about one-half the weight of commercial calcium cyanamid consists of the pure compound, the other half being made up of free lime, carbon, and other impurities. It contains only traces of dicyandiamid and other complex and undetermined compounds. The commercial product undergoes marked changes under the influence of the moisture and carbon dioxid of the air, as is shown by a moistening of the mass, and finally a perceptible loss of ammonia.

As prepared by the more improved methods the loss of nitrogen on storage is relatively small. When stored in thin layers in a dry place a loss of from 1.7 to 1.8 per cent of the total nitrogen in the course of 8 months was observed. When stored under moist conditions, however, the loss was 8 per cent in the same time. Left in bags over two winters and a summer in a moist climate the loss of nitrogen in the form of ammonia was 13.5 per cent. When applied to the soil in normal amounts there is no loss of ammonia, the ammonia formed being absorbed by the soil and nitrified.

Methods of studying the chemical composition of the cyanamid and its transformation products are described. It is shown by means of these that under the influence of moisture and carbon dioxid the lime of the cyanamid is hydrated and carbonated, and more or less of the cyanamid is set free, polymerizing into the form of dicyandiamid, with the accessory production of small quantities of complex nitrogenous compounds.

It was found that calcium cyanamid stored in a dry place for 8 months contained from 10 to 15 per cent of its total nitrogen in the form of dicyandiamid, while that stored under moist conditions contained 80 per cent or more of its total nitrogen in that form.

The results of pot experiments made by the author confirmed the conclusion of Immendorff and Kempski (E. S. R., 20, p. 220) as to the toxicity of the dicyandiamid, but did not sustain that of Ulpiani (E. S. R., 24, p. 226) that the transformation of calcium cyanamid is primarily a purely physico-chemical process. When applied to the soil in normal amounts this compound produced characteristic injuries to plants, particularly buckwheat, as shown in the curling and drying of the extremities of the leaves. The result was the same whether the dicyandiamid was used in the pure state or in the form of altered calcium cyanamid, the extent of injury depending upon the amount of diacyandiamid applied. In all cases the cyanamid which had undergone alteration produced much smaller yields for the same application of nitrogen than that which had been preserved without change. The author therefore concludes that it is of practical importance to avoid carrying over a supply of the cyanamid from one season to another.

In agreement with the results of other investigators the author found that the cyanamid should be well mixed with the soil before seeding and not applied as a top-dressing. When thoroughly incorporated with the soil any dicyandiamid which may be formed is quickly converted into ammonia and nitrified.

On the formation and decomposition of calcium cyanamid, M. Le Blanc and M. Eschmann (*Ztschr. Elektrochem., 17 (1911), No. 1, pp. 20–34, figs. 5*).—This article discusses the theoretical reactions occurring in the formation and transformation of calcium cyanamid, describes methods of analyzing the product, and reports experiments on the equilibrium weights of calcium cyanamid and its products.

The need of the soil for potash, P. Hoc (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 31 (1910), No. 51, pp. 762–764*).—The author questions the correctness of the commonly accepted percentage of potash considered essential to a productive soil, and cites cases of soils containing much more than 0.2 per cent of potash which were nevertheless much benefited by potash fertilizers. He thinks the limit should be raised to from 0.3 to 0.35 per cent at least for intensive culture.

Kainit, Maurecourt (*Engrais, 26 (1911), No. 2, pp. 41–44*).—It is stated that the total amount of kainit used for agricultural purposes in 1909 was 2,578,971 tons. Of this Germany consumed 1,749,389 tons and the United States 404,611 tons.

German potash situation (*Chem. Trade Jour., 48 (1911), No. 1236, pp 77–79*).—The present status of the German potash industry is discussed with special reference to the controversy over American contracts for potash salts.

German potash prices, T. J. Albert (*Daily Cons. and Trade Rpts. [U. S.], n. ser., 1 (1910), No. 49, pp. 652, 653*).—The prices adopted by the new potash syndicate are given.

Our supply of phosphate and its origin, A. J. Woolman (*Ill. Agr., 15 (1911), No. 4, pp. 36–42, figs. 3*).—This is a compiled article on the subject, dealing more particularly with Tennessee phosphates in view of the fact that these deposits are more accessible to the inland regions of the United States and are exported to a less extent. Estimates of the available supply of phosphate in the United States are given as follows: South Carolina 3,000,000 tons, Florida 15,000,000 tons, Tennessee 103,000,000 tons, and western deposits 100,000,000 tons. Emphasis is laid upon the importance of the conservation of this resource.

Tennessee phosphate in 1910, J. Ruhm, Jr. (*Engin. and Min. Jour., 91 (1911), No. 2, pp. 123, 124*).—It is stated that there was renewed activity in the Tennessee phosphate industry in 1910, and greater utilization of low-grade phosphates following experiments by the U. S. Geological Survey. Methods were introduced and developed for saving material formerly left unmined or thrown back into the spoil banks, and a ready market was established for the tailings, which were formerly dumped into the creeks or used for filling. This was a result of work of several of the experiment stations showing the fertilizing value of fine-ground rock phosphate.

Phosphates in Montana, H. S. Gale (*U. S. Geol. Survey Bul. 470–A, pp. 9, figs. 2; Amer. Fert., 34 (1911), No. 2, pp. 15–18, figs. 2*).—Deposits which have recently been discovered in the canyon of the Big Hole River southwest of Butte, Montana, are briefly described.

Analyses of samples of the phosphate show phosphoric acid varying from 14.1 to 35.09 per cent, and indicate the presence of some high-grade phosphate approximately equivalent to 75 per cent tricalcium phosphate. The extent of the deposits has not yet been determined. The Montana field is readily accessible and is favorably situated for shipment by rail to the agricultural centers in the northern Middle West.

The phosphates of the Pacific Isles, Maizières (*Engrais, 26 (1911), No. 3, pp. 69–73, figs. 6*).—It is stated that the principal deposits of phosphate occur on five islands, namely, Christmas, Ocean, Nauru, Angour, and Makatea islands. This article is devoted principally to an account of the exploitation of the Makatea phosphates by a large French company.

Analyses are reported showing the Ocean Island phosphate to contain 39.5 per cent of phosphoric acid, the Nauru Island 40.01 per cent. According to the analysis given the Makatea phosphate contains 38.14 per cent of phosphoric acid and 5.09 per cent of calcium carbonate. The percentages of iron oxid and alumina are very low. The production in 1910 was for Christmas Island 140,000 metric tons, for Ocean and Nauru islands 302,203 tons, and for Angour Island 50,000 tons. The estimated output of Makatea Island for 1911 is 50,000 tons.

The reaction of lime and gypsum on some Oregon soils, C. E. Bradley (*Jour. Indus. and Engin. Chem., 2 (1910), No. 12, pp. 529, 530*).—On the basis of field observations and laboratory studies on typical soils of the State the conclusion was reached that "the soils of western Oregon respond readily to applications of gypsum. Tests on a number of these soils with lime and gypsum under different conditions indicate that gypsum here acts as an indirect potash fertilizer while lime does not. Neither of these fertilizers affects the amount of water-soluble phosphates in the soil."

Note on the composition of soot, H. W. Harvey (*Jour. Agr. Sci., 3 (1910), No. 4, pp. 398, 399*).—Analyses of samples of soot from various sources showed nitrogen varying from 0.5 per cent in soot from a boiler shaft weighing 47 lbs. per bushel to 11 per cent in soot from a kitchen chimney weighing 9 lbs. per bushel, indicating that in general the proportion of nitrogen varies inversely as the weight per bushel. It is therefore suggested that soot be bought by volume and not by weight.

Analyses of seaweeds, W. H. Barlow (*Jour. Bd. Agr. [London], 17 (1911), No. 10, p. 832*).—Analyses of samples of *Fucus nodosus*, *F. serratus*, and *F. vesiculosus* are reported. The percentages of nitrogen found in the dry material were 1.78, 2.88, and 2.29, respectively; of potash 4.47, 5, and 6.29, respectively; and of phosphoric acid 0.29, 0.55, and 0.45, respectively.

Inspection of commercial fertilizers, H. D. Haskins, L. S. Walker, and J. F. Merrill (*Massachusetts Sta. Bul. 135, pp. 75*).—"This bulletin gives a detailed report of the fertilizer inspection for 1910. It summarizes the main points of the fertilizer law, states the number of fertilizers collected and analyzed, gives the trade values of fertilizer ingredients, discusses valuations, retail cash prices, and percentages of difference. It makes clear the economy of buying only high-grade fertilizers by showing the cost per pound of the several elements in the different grades. Mention is made of all brands showing a noticeable commercial shortage and the tables of analyses give the detailed composition of all fertilizers sold in Massachusetts."

Analyses of various brands of so-called lava fertilizers are reported and their value is discussed.

Results of the fertilizer inspection for 1910, B. E. Curry and T. O. Smith (*New Hampshire Sta. Bul. 150, pp. 10*).—The results of analyses of 138 samples of fertilizers are reported.

The averages for 94 brands of complete mixed fertilizers were nitrogen 2.36 per cent, available phosphoric acid 6.83 per cent, potash 5.07 per cent, selling price $1.60 per hundred pounds. "The consumer might have obtained the same amount of nitrogen, phosphoric acid, and potash in the unmixed condition for 93 cents."

AGRICULTURAL BOTANY.

A text-book of botany.—I, Morphology and physiology, J. M. Coulter, C. R. Barnes, and H. C. Cowles (*New York, Cincinnati, and Chicago, 1910, vol. 1 pp. VIII+484+A–L, figs. 699*).—This book is the outgrowth of 10 years' work in developing a course of undergraduate instruction in botany at the University of Chicago. The work is intended only for the use of undergraduate students, and the authors state that "the point of view has been to help the student to build up a coherent and substantial body of knowledge and to develop an attitude of mind that will enable him to grapple with any botanical problem, whether it be teaching or investigation."

The authors make no claim for this book being a formal contribution to knowledge, but it is offered as an outline of material frequently worked over by their students, together with the results of some investigations conducted in their laboratories, and some minor observations and conclusions not published elsewhere.

Sap-raising forces in living wood, E. Reinders (*K. Akad. Wetensch. Amsterdam, Proc. Sect. Sci., 12 (1910), pt. 2, pp. 563–573*).—The author discusses the vital and cohesion theories of sap ascent, and gives the results of manometer experiments with a number of small trees. From these it appears that water in the living tree is pumped up by living elements but that the ascent in the dead tree is due to other forces, assisted by cohesion.

A brief bibliography is appended.

Contribution to the knowledge of the movement of water in plants, K. Zijlstra (*K. Akad. Wetensch. Amsterdam, Proc. Sect. Sci., 12 (1910), pt. 2, pp. 574–584, fig. 1*).—The author places on record data regarding experiments on the movement of water in plants, circumstances having arisen that prevented him from concluding his investigations. He tested the movement of water as influenced by cooling the stems of plants by packing a portion of the stems in an ice jacket, traced the ascent of staining fluids through cut branches, and describes the effect of permanent interruptions of the transpiration current by deep incisions in the trunk of a tree.

In the first series of experiments the action of the living cells was cut out by freezing, yet there was no evidence of wilting on the part of the leaves, and transpiration, as determined by the cobalt test, was not impaired. The ascent of the staining solution was traced through living and dead wood, the different tissues staining in such a way as to show that the path of ascent was through different regions, depending on whether the tissues were living or dead.

In the third series of experiments a small tree was sawed into transversely to slightly beyond the center at four places, alternately on either side of the trunk. Into the incisions were placed tin plates, so that the water current was permanently checked. This experiment was started in July, 1908. That season most of the leaves turned yellow and fell from the tree, but the following year the foliage developed as well as before the experiment and remained fresh throughout the entire season.

Studies on the relation of the living cells to transpiration and sap flow in Cyperus, I, J. B. Overton (*Bot. Gaz., 51 (1911), No. 1, pp. 28–63, fig. 1*).—A report is given of experiments with the common umbrella plant (*C. alternifolius*) to determine the effect of killing portions of the stems on their transpiration and sap flow, comparisons being made with stems cut and placed in water as well as with stems that had not been severed from the roots.

The rate of sap flow in potted plants was found to vary from 145 to 240 cm. per hour, while for the cut plants it was a little higher, from 180 to 250 cm. per hour. Where portions of stems were killed by steam, heated wax, or poisons the plants continued to take up water for a considerable time and remained turgid longer than those in which the stems were cut and inserted in water.

The author found that the withering of the leaves on stems which had been killed with heat was not due to a lack of water, but to the toxic action of substances which had been carried to the leaves. It was also learned that the longer the heated region the more rapidly the leaves withered. Leaves above a steamed or otherwise heated portion of the stem did not wither in the same way as those simply deprived of water, but were often discolored before shriveling. A histological examination of such portions showed that the protoplasts and chloroplasts resembled those under diseased conditions more than those in leaves which were merely drying out for a lack of water supply.

On the substitution of assimilating organs in plants from an anatomical-biological point of view, B. Jönsson (*Vikariat inom Växtriket vid Näringsberedning, sedt från Anatomisk-Biologisk Synpunkt. Lund, 1910, pp. 33*).—This is a preliminary and somewhat general account of a study of the phenomenon of substitution of organs in plants for the process of elaboration of organic food materials from inorganic sources.

The author shows that such substitution occurs more frequently than is ordinarily considered to be the case and may take place in the stem, roots, or flowers of different species of plants. The most important substitution is, however, found in the case of the stem and the least among other parts which are exposed to the action of sunlight and which generally stand in a more or less close relation to the reproductive phenomenon.

Experiments upon Drosera rotundifolia as to its protein-digesting power, W. J. Robinson (*Torreya, 9 (1909), No. 6, pp. 109–114*).—The author gives a report on a series of experiments on the digestive power of the leaves of *D. rotundifolia*, undertaken for the purpose of ascertaining whether the purer proteins now available would give any different results from those obtained by Darwin with tissue fragments or crude protein materials. The proteins used were prepared under the direction of W. J. Gies, with the exception of the nucleoprotein.

The results of the experiments indicate the ready digestibility of dry egg white, fibrin, tendomucoid, and nucleoprotein. Acid albumin, alkali albuminate, and edestin were digested, but less readily than the others. Collagen and elastin appeared entirely indigestible. Creatin did not cause bending of the tentacles.

The proteolytic enzyms of Drosera were found to be like those of other organisms, able to digest some proteins and unable to digest others.

The proteolytic enzym of Drosera, Jean White (*Proc. Roy. Soc. [London], Ser. B, 83 (1910), No. B 562, pp. 134–139*).—Experiments have been carried on to determine the nature of the proteolytic enzyms of Drosera, a number of species of this plant being used.

From the evidence attained it seems that the digestive process of the proteolytic enzym present in the leaf glands of Drosera does not extend farther than the production of peptones, and there seems to be no trace of other proteolytic enzyms such as erepsin or trypsin. The author has made many attempts to find signs of protein digestion carried to the amid stage, but has always been unsuccessful.

Investigations in chlorophyll, R. WILLSTÄTTER ET AL. (*Liebig's Ann. Chem.*, *378 (1910), No. 1, pp. 1–152, figs. 8*).—This consists of papers on the chemical composition of chlorophyll, as follows: Comparative Investigations of Chlorophylls of Various Plants, R. Willstätter and A. Oppé; Studies on Chlorophyllase, R. Willstätter and A. Stoll; and Studies on Phytol, R. Willstätter, E. W. Mayer, and E. Hüni.

The beginning of photosynthesis and the development of chlorophyll, A. A. IRVING (*Ann. Bot.* [*London*], *24 (1910), No. 96, pp. 805–818, figs. 2, dgms. 8*).—Experiments with seedlings of barley and *Vicia faba* to determine how soon photosynthesis attains an appreciable magnitude with young leaves developed in light, or when etiolated leaves are exposed to light and turn green, show that etiolated leaves do not possess any appreciable power of carrying out photosynthesis of carbon dioxid, either when they are orange yellow or when they have developed a large part of their green chlorophyll. When the power of photosynthesis does appear, after the leaves have attained almost a full green color, it develops very rapidly.

The author believes that the first development of the function of photosynthesis is not in any relation to the amount of chlorophyll produced, and that the amount of chlorophyll is not a limiting factor to assimilation in the early stages of assimilating organs. If this hypothesis is true, the author holds that some other component part of the photosynthetic machinery controls the beginning of complete functional activity.

A physiological study of the germination of Helianthus annuus, E. C. MILLER (*Ann. Bot.* [*London*], *24 (1910), No. 96, pp. 693–725, figs. 6, dgms. 18*).—A study was made of some of the changes taking place during the germination of sunflower seed.

During the first 3 days after planting the seed, the rudimentary roots and hypocotyls reached a length of from 2.5 to 3.5 cm. The cotyledons at this time had absorbed an amount of water equal to 50 per cent of their weight, while the water in the hypocotyls and roots amounted to 90 per cent. During this time the most intensive respiration in the development of the seedlings took place, for at one end of this period the total weight of the seedlings amounted to only $\frac{7}{8}$ that of the resting seed. Five-sixths of the sugar content of the cotyledons, $\frac{1}{7}$ of the oil, and about $\frac{1}{4}$ of the protein had also disappeared.

As the development of the seedlings advanced, the depletion of the reserves in the cotyledons advanced from the point nearest the hypocotyl to the end remote from it. The most marked change in the reserve material took place between the time when the cotyledons were breaking through the ground and the period when they were fully developed into foliage organs.

The protein reserve during the progress of germination was broken up apparently into ordinary cleavage products, which were transported to the roots and hypocotyls, where they were used in the formation of new cell contents.

The oil during the advance of the seedlings was in part broken down into free fatty acids and glycerin. The marked increase in the amount of sugar during the progress of development of the seedlings seems to make it certain that it had its origin in the oil reserve. The cotyledons at no time contained any appreciable amount of sugar, but it was present in abundance in the hypocotyls at all stages. The amount of cellulose in the cotyledons remained constant, since no new cells were formed. The sugar produced from the oil was used by the plant for the formation of new cell walls in the growing parts.

Whether this oil is transported from the cotyledons to the growing parts and then transformed, or whether the transformation takes place in the cotyledons previous to transportation, was not determined.

Development and nutrition of the embryo, seed, and carpel in the date, F. E. LLOYD (*Mo. Bot. Gard. Ann. Rpt., 21 (1910), pp. 103–164, pls. 4, figs. 2*).—Studies are reported on the anatomy and histology of the seed and carpel of the date and on the rôles of tannin, starch, oil, and reserve cellulose in its development.

Starch was found to play a very brief rôle, only traces of it being present after the seventh week of the development of the embryo. Tannin, of which the author recognizes two forms, appears in the embryo throughout the entire period of its development. Aplastic tannin appears in certain cells and remains permanently, while plastic tannin undergoes translocation and seems to be the principal nutrient used during the younger stages of development. The aplastic tannin is considered a waste product. Oil appears in the endosperm, reaching a maximum, after which there is a gradual reduction until the secretion of reserve cellulose has advanced to a considerable extent. Oil then accumulates until the resting period is reached, and during germination it is digested before passing to the embryo. The digestion of the primary cell walls occurs near the embryo, the digestive ferments being secreted entirely by it.

The respiration of barley during germination, with special reference to the protein content, B. ABRAHAMSOHN (*Wchnschr. Brau., 27 (1910), Nos. 47, pp. 589, 590; 48, pp. 602–605, figs. 2; 49, pp. 613–615; 50, pp. 627–629; 51, pp. 638–640, dgms. 2*).—A report is given of experiments conducted to determine the effect of sterilization and protein content on the respiration of germinating barley. Sterilized grain was found to respire less abundantly than nonsterilized, and the respiration of small grain was greater than that of large seed. The greater the protein content of the samples of barley the higher was their respiration.

The synthetic formation of asparagin by plants, D. N. PRIANISHNIKOV and I. S. SHULOV (*Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 4, pp. 533–543*).—Experiments have been conducted to determine the ability of plants to form asparagin from ammonium compounds.

In the first series which was carried on with peas, a 0.1 per cent solution of ammonium chlorid not only checked growth and protein metabolism but also prevented the formation of asparagin. With barley, however, positive results were obtained, asparagin evidently being synthetically formed from the ammonium compound. Later experiments showed that the solution of ammonium chlorid was physiologically acid to peas, and when by the addition of calcium carbonate this condition was corrected an undoubted synthesis of asparagin took place. Similar results were obtained where calcium sulphate was added to the nutrient solution.

Trials of nitrogen-fixing organisms, G. T. MALTHOUSE (*Harper-Adams Agr. Col. Joint Rpt. 1908, pp. 20, 21*).—The results are given of a series of experiments with nitro-bacterine and another bacterial culture on beans, red clover, peas, sweet peas, white clover, scarlet runner, sainfoin, and tomatoes, in which the trials were carried out in open ground plats and in boxes of steamed sand plunged in ashes in a large wire frame.

The results obtained from both the open ground and box trials indicate that on a barren soil the use of the cultures may be of some value, but that on ordinary soil there is little benefit to be derived from either preparation.

Concerning the physiological rôle of latex, C. BERNARD (*Ann. Jard. Bot. Buitenzorg, 1910, Sup. 3, pt. 1, pp. 235–276, figs. 4*).—A review is given of various theories regarding the function of latex in plants, and the author describes his investigations with a number of species of plants which produce latex. From the action of seedlings of these plants when grown in light and darkness and from the fact that latex contains a number of compounds, such as sugars, starch, fats, and albuminoid substances, he believes that latex plays an important rôle in the nutrition of the plant and is not to be considered a waste product.

Tests for tannin in the living plant and the physiological significance of tannin, C. VAN WISSELINGH (*K. Akad. Wetensch. Amsterdam, Proc. Sect. Sci., 12 (1910), pt. 2, pp. 685–705*).—A description is given of a method of demonstrating tannin in living plants by means of solutions of antipyrin and caffein used as microchemical reagents. The tannin is precipitated and its abundance is estimated from the color and amount of the precipitate.

In studying the function of tannin, experiments were made with Spirogyra, and it was found that cell division and cell-wall growth ceased when the tannin had been precipitated. On this account it is believed that tannin must serve as a plastic substance in the building up of cell walls.

In conclusion the author states that tannin in the plant studied is not a reserve material but belongs to the soluble substances which the plant continually requires for its development. It disappears and gives way to reserve material when the plant forms zygospores and passes into the resting condition.

The effect of acids, alkalis, and some inorganic salts on plants, K. K. GEDROITS (*Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), Nos. 4, pp. 544–578, figs. 3, dgm. 1; 5, pp. 641–678, fig. 1*).—Studies are reported by which the author sought to determine the lowest concentration of certain compounds that would result in the death of plants and also the highest concentration they could withstand without injury. The plants, which were flax, mustard, vetch, alfalfa, oats, and barley, were grown in water cultures and the effects of the following acids, alkalis, and compounds were tested: Nitric, hydrochloric, sulphuric, phosphoric, acetic, and citric acids, caustic potash, magnesium chlorid, potassium nitrate, calcium nitrate, potassium sulphate, potassium chlorid, magnesium sulphate, and a saturated solution of calcium sulphate.

Flax was found most susceptible to the action of the acids, followed by mustard, vetch, and barley in the order named. With the alkali, flax and mustard showed the least limit of resistance and oats and barley the widest variation. In their relation to the limits of high and low concentrations of the salts used, all the plants were very similar in their behavior.

The plants were found to be readily divided into two groups, mustard and flax being somewhat the most susceptible, with vetch, alfalfa, oats, and barley following in the order named. Arranging the salts according to their injurious action, magnesium sulphate ranked first, followed by magnesium chlorid, potassium sulphate, and potassium chlorid, with calcium nitrate and potassium nitrate the least injurious.

The influence of iron on the formation of spores in Aspergillus niger, G. LINOSSIER (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 23, pp. 1075, 1076*).—The author comments on a previous article (E. S. R., 24, p. 32) relating to the influence of iron on the formation of spores in this fungus, and calls attention to an earlier publication in which he has shown that iron is a conspicuous constituent of the coloring matter of the fungus without which there is no spore formation.

On the death of plants from low temperatures, A. RICHTER (*Centbl. Bakt. [etc.], 2. Abt., 28 (1910), No. 25, pp. 617–624*).—The results of low temperature experiments with *Aspergillus niger* are given, in which the mycelium of this fungus was subjected to freezing temperatures for 24 hours by means of a mixture of ether and carbon dioxid, and then thawed.

The mycelium when thawed and kept at a temperature from 18 to 19° C. showed no signs of life or plasmolysis, gave off no carbon dioxid, and stained throughout with anilin dyes, but when the temperature was raised to from 30 to 34° the fungus developed rapidly, formed spores, and gave off carbon dioxid gas very energetically. When the fungus was not subjected to the optimum temperature of 30 to 34° after thawing, it soon died.

It is claimed that in these experiments with the frozen Aspergillus mycelium the boundary line between living and dead protoplasm has disappeared.

Notes on intumescences in roots, H. V. DAVIS (*New Phytol., 9 (1910), No. 8–9, pp. 325, 326*).—Previous investigations by Bayliss (E. S. R., 19, p. 527) and others having shown that there is an abnormal elongation of cortical cells following injuries to epidermal tissues, the author has undertaken to determine the nature of the response on the part of roots.

The primary roots of seedlings were injured by passing an electric current through them in contact with platinum electrodes, by passing an electric current through soil in which the seedlings were growing, by a spark from a coil passed through the roots, by the application of acids and alkalis, and by burning with a hot glass rod. In all cases the seedlings were allowed to continue growth in sawdust after the production of the injury.

Sections showed that where the epidermal cells had been destroyed and a scar formed, the uninjured cortical cells below the scar had elongated toward it. The length of the hypertrophied cells was found to be dependent on the time allowed for their growth.

In the experiments where roots were growing in a soil through which a current was passed no intumescences were formed. This was believed to be due to the fact that the current did not pass through the roots, since they offered a greater resistance than the moist soil, and consequently there were no sudden chemical or thermal changes in the root and no wound. For this reason, it is believed that the electric stimulation acts as a traumatic stimulus.

The effect of tarring roads on plants, M. MIRANDE (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 21, pp. 949–952*).—A study has been made of the influence of tarring roads on plants, not only in close proximity to the road, where there might be some injury through the soil, but at a greater distance, where the injury would be due to dust and vapors arising from the road.

The author seems to think that the greatest injury is done through the vapors which are given off in considerable abundance during dry, hot weather. In this case the greatest injury would be to trees and plants along the border of the road, in parks, or in closely settled regions, and less injury would be observed in the open country.

The author states in conclusion that if trees and ornamental plantings in cities are to be preserved, the use of tar on roads should be made with care.

The influence of tarring roads on neighboring vegetation, E. GRIFFON (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 23, pp. 1070–1073*).—The author states that laboratory experiments covering three seasons have confirmed the conclusion of Mirande (see above) regarding the injurious nature of the gas given off from tar when used for coating roads, yet from extensive observations he thinks the probable injury to vegetation in the open country would be very small.

A method of selection applicable to tropical agriculture, P. J. S. CRAMER (*Ann. Jard. Bot. Buitenzorg, 1910, Sup. 3, pt. 1, pp. 461–472*).—Attention is called to the wide variability of indigenous plants in the Tropics, and various methods of improvement selection are described.

The author advises a study of the various types that are presented by wild species which appear to have some economic value, after which seed of all should be collected, planted separately to avoid the possibility of crossing, and again studied. Only those that have superior merit should be introduced into cultivation. In this way many worthless introductions and much waste of time in testing them would be avoided.

The inheritance of sizes and shapes in plants, R. A. EMERSON (*Amer. Nat., 44 (1910), No. 528, pp. 739–746*).—A preliminary account is given of studies on the inheritance of size and shape of fruits of gourds and summer squashes, size and shape of bean seeds, and size of grains and height of stalks in maize. There appears to be a blending of these characters in the F_1 generation, followed by a segregation in the F_2. These phenomena, the author states, are more complex than those of the inheritance of color, etc.

The author calls attention to some of the possible causes of error in interpreting results of this kind.

The nature of graft hybrids, D. H. CAMPBELL (*Amer. Nat., 45 (1911), No. 529, pp. 41–53, fig. 1*).—The author gives a description of the graft hybrids of Solanums produced by Winkler (E. S. R., 21, p. 320). The different hybrids were studied, but of these only *S. darwinianum* appears to be a hybrid in the strict sense of the word.

All of the hybrids were propagated by cuttings and, with the single exception of *S. kœlreuterianum*, produced ripe fruit which in every case was more or less intermediate in character between the fruit of the nightshade and the tomato. In a number of instances spontaneous reversions were observed, and in the second generation all the seedlings derived from the hybrids reverted to the parent form which the hybrid most nearly resembled.

The study of the tissues of *S. darwinianum* indicated that the subepidermal tissue from which the sporogenous cells develop is of genuine hybrid nature, arising from a fusion of the cells, including the nuclei derived from the two parent forms.

The inheritance of color and other characters in the potato, R. N. SALAMAN (*Jour. Genetics, 1 (1910), No. 1, pp. 7–46, pls. 29, figs. 2*).—The experiments reported were begun in the spring of 1906 and are still in progress, the author giving an account of some of his observations on the inheritance of different characters.

He has found among the domestic varieties that the twist of the leaf is a recessive character, while length of tuber and depth of eye are dominant to roundness and shallowness. Purple is dominant to red in the tubers, and red to white.

Studies made with some of the wild species of Solanum indicate that *S. etuberosum* is not subject to the same laws of dominance as the domestic varieties of potatoes. Among the seedlings of this species are some which thus far are immune to attacks of *Phytophthora infestans*, and this immunity on the part of *S. etuberosum* has proved to be a recessive character.

The author concludes that *S. etuberosum* may be a hybrid, and, if so, that its parents are possibly native species.

The mode of inheritance of stature and of time of flowering in peas, F. KEEBLE and MISS C. PELLEW (*Jour. Genetics, 1 (1910) No. 1, pp. 47–56*).—The experiments of the authors throw some light on the factors which determine height of peas and the mode of inheritance of earliness and lateness of flowering in this species. It was found that the flowering period was definitely associated with the length of internodes and thickness of the stems. Tallness was correlated with the same factors, and early flowering was associated with long internodes. Long internodes were dominant to short ones, and late flowering to early. It is stated that attention should be given to these facts in crossing varieties of peas.

The nature of the influence in inducing precosity of flowering and physiological problems attending the phenomena are not discussed.

Studies in the inheritance of doubleness in flowers, E. R. SAUNDERS (*Jour. Genetics, 1 (1910), No. 1, pp. 57–69, figs. 7*).—Studies were made with several species and garden varieties of petunias to determine the phenomena connected with doubling of flowers.

Single petunias belonging to the forms used, whether self-fertilized or crossed with each other, yielded singles. Cross-bred singles derived from one single and one double flowered parent produced singles when self-fertilized or fertilized among themselves. Singles crossed with pollen from a double yielded doubles in the first generation, and there was some evidence to show that this was in a constant ratio. The stamens in the double flowers were found to be functional, but the pistil was more or less deformed and when fertilized yielded no seed, hence the double character can only be introduced from the staminate side, and this operation must be repeated in each generation. Doubleness was found to behave as the recessive and singleness as the dominant character.

White flowered varieties of Primula sinensis, F. KEEBLE and MISS C. PELLEW (*Jour. Genetics, 1 (1910), No. 1, pp. 1–5.*)—The authors state that white flowered varieties of *P. sinensis* are of two kinds, one with red or reddish stems and the other with green stems. Colored stemmed whites, when crossed with a variety with colored flowers, yield an F_1 with white or tinged flowers. Green stemmed whites, when similarly crossed, yield an F_1 with colored flowers.

It is the purpose of this brief paper to record the existence of what appear to be exceptions to the rule of dominant white among colored stemmed, white varieties.

Root parasitism in Exocarpus, MARGARET BENSON (*Ann. Bot. [London], 24 (1910), No. 96, pp. 667–677, pl. 1, figs. 3*).—A study is reported on species of Exocarpus, a shrub found growing parasitically on a number of species of woody plants. Comparisons are made with Thesium, a plant of similar habit.

FIELD CROPS.

The interpretation of experimental results, T. B. WOOD and F. J. M. STRATTON (*Jour. Agr. Sci., 3 (1910), No. 4, pp. 417–440, figs. 10*).—The authors discuss the use of frequency curves and the calculation of probable error in the interpretation of experimental data, illustrating the application of probable error methods to questions of sampling for analysis and to field and feeding experiments.

The probable error of field experiments was studied by two independent methods and estimated at about 5 per cent of the crop, regardless of the size of plat employed, providing it is 1/80 acre or larger. By the use of large numbers of plats and systematic duplication, accurate results may be obtained with plats as small as 1 square yard.

The use of a single animal on a fattening ration gives a probable error of about 14 per cent of the live-weight increase produced, and in an ordinary experiment it is calculated that at least 29 animals must be used to obtain a precision of 10 per cent.

Tables show the number of animals or plats required to attain a given degree of precision.

The breeding of agricultural plants, C. Fruwirth (*Die Züchtung der Landwirtschaftlichen Kulturpflanzen. Berlin, 1910, vol. 4, 2. ed. rev., pp. XVI+460, figs. 39*).—The first edition of this work has already been noted (E. S. R., 19, p. 427), as have revisions of other volumes (E. S. R., 21, p. 543).

[Experiments at the Glen Innes Farm with grasses, clovers, and alfalfa], J. E. O'Grady, (*Agr. Gaz. N. S. Wales, 21 (1910), No. 12, pp. 1064–1075, pls. 2, figs. 2*).—A description of the farm and its facilities is followed by a brief progress report of experimental sowings of alfalfa, clovers, small grains, and numerous grasses. Alfalfa gave better results when drilled at the rate of 8 lbs. per acre than when seeded at higher or lower rates.

The production of alfalfa, R. G. Osés (*Estac. Agr. Expt. Rio Verde, San Luis Potosí, Bol. 6, pp. 76, pls. 6*).—This is substantially a reprint of a publication previously noted (E. S. R. 23, p. 535).

Value of corn in holding moisture, L. R. Waldron (*Farm, Stock, and Home, 27 (1911), No. 3, pp. 102, 103*).—The author reports experiments in which corn and wheat were grown continuously on two plats, while the Campbell summer tillage system was used on a third.

The most careful alternate summer tillage failed to save as much moisture as was retained by growing a crop of corn each year. On the corn plat the moisture content was increased to a depth of at least 15 ft. and the tenth foot contained nearly as much moisture as any. "Had wheat been grown part of the time, moisture would not have penetrated so deeply." In the fall of 1910 after 4 years' test, the first 10 ft. of soil on the corn plat contained 22.8 in. of water, the wheat plat 14.2 in., and the summer tillage plat nearly 20 in.

Experiments in corn cultivation, E. Tarragó (*Min. Agr. [Argentina] Div. Enseñanza Agr. [Pub.], 4. ser., 1910, No. 10, pp. 14, figs. 5*).—The author states the methods and describes the varieties used in the test. Morocho and Oriental produced the highest grain yield. Piamontes and Quarantain had the shortest growing periods, 103 and 79 days, respectively. Tables state the yield, shelling percentage, weight per hectoliter, vegetation period, and dates of planting, germination, and maturity for each variety tested.

Preliminary observations concerning natural crossing in cotton, H. A. Allard (*Amer. Breeders Mag., 1 (1910), No. 4, pp. 247–261, figs. 2*).—The author regards natural crossing as an overlooked factor in cotton breeding and discusses the arrangement of parent types to determine natural crossing. A table shows that about 20 per cent of the bolls observed in a mixed planting of Keenan and Okra were crosses, but he believes that there is strong probability that 40 per cent of the blossoms may be crossed and that crossing is beneficial in selected, but detrimental in unselected, cotton. Cross pollination by various insects is discussed and the results of observations of bees among cotton blossoms stated.

Cotton culture, M. Passon (*Die Kultur der Baumwollstaude. Stuttgart, 1910, pp. 118, figs. 7*).—A brief history of the cotton plant and statement of its original habitat is followed by a classification of the varieties and strains, and discussions of its climatic, soil, and fertilizer requirements, the preparation and planting of the seed, managing the fields, cultivating, topping, harvesting, and ginning, and marketing the crop. Cotton breeding and the utilization of the seed and its products are also dealt with.

The chemistry of the Kafir corn kernel, R. O. Baird (*Oklahoma Sta. Bul. 89, pp. 3–15, figs. 2*).—The author finds that the "Kafir kernel ranks close to corn as a food, as shown by the analyses of the proximate constituents." Kafir corn and Indian corn are estimated to contain 38 and 39.2 lbs. of fermentable material per bushel respectively, capable of producing 18 and 19 lbs. of alcohol at a grain cost of 12 and 14 cts. per gallon of alcohol, with corn at 37½ cts. and Kafir corn at 30 cts. per bushel. Kafir-corn fat is thought to excel corn oil for the manufacture of soaps and fatty acids but proved valueless as a lubricant. The crop removes less important plant food from the soil than does corn.

Results of analyses and of determinations of the constants of corn oil are reported and digestion experiments of the station previously noted (E. S. R., 11, p. 277; 12, p. 872) are summarized. Frequent citations are given of the literature of the subject.

The chemical composition of Kafir corn, R. O. BAIRD and C. K. FRANCIS (*Jour. Indus. and Engin. Chem., 2 (1910), No. 12, pp. 531–534, fig. 1*).—This article presents material noted above.

[Growing Pampas grass in Mexico], L. MARTÍNEZ (*Estac. Agr. Expt. San Juan Bautista, Tabasco, Bol. 1, pp. 8*).—Suggestions for growing *Gynerium argenteum* are followed by data on the labor cost of its production in Mexico.

[Experiments in peanut culture], A. SCHULZ (*Min. Agr. [Argentina] Div. Enseñanza Agr. [Pub.], 4. ser., 1910, No. 11, pp. 16, figs. 3*).—Paris green used at a strength of 1:1,000 destroyed the vines, so early planting to avoid insect pests is advised. Yields obtained on light, strong, and clay soils are reported in tabular form. The 1,000-kernel weight from hulls containing 1, 2, 3, and 4 kernels ranged from 595.8 to 380.3 gm. on light soil, from 567.1 to 413 gm. on strong soil, and from 625 to 461.2 gm. on clay soil. The shelling percentages of the 1, 2, 3, and 4 kernel legumes were 71, 72, 74.3 and 74.7, respectively.

Itemized statements are given comparing the cost of production of the crop by laborers *v.* students, and oxen *v.* horses. Tests indicate that hilling is disadvantageous, especially on strong land, and that to secure uniform germination the dry, unshelled seed should be soaked in water for 24 hours, and then kept in the shade for about 36 hours, or until the germinating kernels burst the hulls. Planting 32 in. apart each way gave too much space.

On the production of potatoes of a high starch content, W. CHRISTIE (*Tidsskr. Norske Landbr., 17 (1910), No. 9, pp. 436–447*).—This paper gives an account of potato trials conducted at the Hedemarken Experiment Station during 1906–1909 and discusses the various factors that influence the yield, quality, and general value of the potato crop. Successive plantings at 10-day intervals, beginning May 10, showed a continuous decrease of total yield and value per acre of crop and of starch percentage. Planting June 20 produced only $\frac{3}{5}$ as large a yield, with less than $\frac{1}{2}$ the value per acre. The starch percentage fell from 15.7 to 13.2.

A study of the composition of the rice plant, W. P. KELLEY and A. R. THOMPSON (*Hawaii Sta. Bul. 21, pp. 7–51, charts 2*).—The earlier rice work of the station (E. S. R., 20, p. 137; 22, p. 29) is briefly reviewed, and studies reported of the effect of fertilization on the composition of the rice plant, the absorption of nutrients by the plant, and the carbohydrates found in it, with frequent references to other work bearing upon the subject. Data are presented for two different crops of rice, including detailed analyses of the plants just before the formation of the flower, at the time of full flower, at maturity, and at the first and second harvests. The authors regard their conclusions, as drawn from this data, as preliminary but probably correct.

Fertilization with nitrogen, with or without minerals, markedly increased growth at all periods, and considerably increased the percentage of nitrogen found in the dry matter at the first harvest of each crop, but that in the matured plant was not materially changed by fertilizers. Minerals alone or with nitrogen slightly increased the growth in the spring crop but with a corresponding decrease in the fall growth.

The potash content at every period of growth was higher after the application of complete fertilizer than when nitrogen alone was used. A decreased absorption of potash followed the application of minerals alone.

During the first period of growth the percentage of phosphoric acid was influenced by fertilizers but not subsequently. The percentages of calcium and magnesium did not vary greatly in the several periods. At maturity the calcium is largely stored in the leaves, the magnesium in the grain. The hydrolizable carbohydrates vary inversely with the nitrogen absorbed

During the early growth the percentages of nitrogen, phosphoric acid, and potash are high, but these are gradually reduced during later development. Seasonal variations influence growth and composition especially during the first period. When two-thirds grown the rice plant has taken up about four-fifths its maximum nitrogen and phosphoric acid, and nine-tenths of its potash, so fertilizers should be applied before or soon after planting.

Reducing sugars occur in notable quantities at all stages of growth, especially during the first period. Sucrose occurs as a trace during the first period and to the extent of 10.38 per cent during the second, but has largely been converted into starch at maturity. Starch gradually increases from the first period to maturity when it is largely stored in the grain. Pentose-forming bodies constitute a large percentage of the plant at every stage, reaching practically a maximum at flowering. Cellulose also almost reaches a maximum in the second period and occurs in large quantities in all parts of the plant except the grain.

Report of the Krasno-Ufimsk Industrial School for 1908, S. Levochkin (*Abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 3, p. 402*).—The yield of winter rye was increased following a complete fertilizer 74 per cent, with nitrogen and phosphorus 61 per cent, with phosphorus alone 44 per cent, and with nitrogen alone 22 per cent. With kainit the yield was sometimes lowered.

Influence of the depth of turning under artificial fertilizers on the yields of sugar beets, V. V. Bukraba and K. F. Murashko (*Khozīāistvo, 1909, Nos. 26, 27; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 1, pp. 110, 111*).—These experiments were carried out at the Kiev Polytechnic Institute in 1907 and 1908 on small plats (49 sq. ft. each in 1907 and 204 sq. ft. in 1908). The fertilizers were worked under at depths of 5, 10, 20, and 25 cm. In the rather rainy year 1907 20 cm. proved the most favorable depth, while in the rather dry year 1908 10 cm. proved the optimum.

Sugar beet culture and the manufacture of beet sugar, A. Stift and W. Gredinger (*Der Zuckerrübenbau und die Fabrikation des Rübenzuckers. Vienna and Leipsic, 1910, pp. VIII+667, figs. 273*).—This book is intended for the instruction of the embryo technologist and as a ready reference for the mature sugar manufacturer and beet grower.

Report of Harvard Experiment Station, E. F. Atkins (*Cuba Mag., 2 (1911), No. 5, pp. 25–29*).—A report of operations with sugar cane at the Harvard Experiment Station at Cienfuegos, Cuba, where experiments with economic tropical plants are in progress under the auspices of Harvard University.

As little rain fell between October 15, 1909, and June, 1910, many foreign varieties were killed. Reports of the condition of the seedling canes showing extracted sucrose in excess of 12 per cent are given, together with numerous analyses of seedlings and rattoon canes.

Work of experimental stations in 1909 (*Canada Dept. Agr., Tobacco Div. Bul. A9, pp. 51, pls. 12*).—This bulletin consists of three articles.

I. *Experimental stations for the growing of tobacco*, F. Charlan.—The author gives a brief progress report of work done at the St. Jacques, St. Césaire, and Harrow stations.

II. *Work of the tobacco division in the Province of Quebec in 1909*, O. Chevalier.—This is a progress report of work done in continuance of that already noted (E. S. R. 22 p. 337). The work done at St. Jacques and St. Césaire is described in detail. Hybrid, Comstock, and Sumatra produced the highest yields, 1,875, 980, and 875 lbs. per acre, respectively. In a fertilizer test the maximum yield of 1,128 lbs. per acre followed the application of 500 lbs. of sulphate of ammonia, 300 lbs. each of sulphate of potash and superphosphate, and 15 tons of farmyard manure, per acre. The same mixture without superphosphate yielded 1,026 lbs. Notes are given on the plant characteristics and the yields of the different varieties grown. The Big Ohio yielded over 2,000 lbs. per acre, and will be further tested.

III. *Experimental work carried on in 1909*, W. A. Barnet.—In a test of 6 varieties, Reid Yellow Dent produced the maximum corn yield of more than 135 bu. per acre. Oats proved ill adapted to the soils, and were replaced by wheat, which proved the better nurse crop for clover.

Plant bed work indicates that cigar varieties were ready for transplanting from 5 to 8 days earlier than others. Virginia type beds had to be changed from a cotton to a glass covering to obtain sufficiently early plants. Nitrate of soda stimulated plant growth successfully, especially in the final stages, but did not benefit germination. The temperature ranged from 9 to 27° F. higher under glass than under cotton, notably in the afternoon. An application of 625 lbs. of sulphate of ammonia, 375 lbs. each of sulphate of potash and superphosphate, and 15 tons of manure per acre was followed by a yield of 2,424 lbs. of tobacco per acre, or more than twice that grown on the check plat. Less than 18 lbs. difference in yield followed the use of 375 lbs. sulphate of potash instead of 625 lbs. sulphate of ammonia, each being used with 375 lbs. superphosphate. In curing experiments the process was completed with yellow tobacco in from 3 to 5 days by artificial heat. Formulas are given for guidance in curing yellow and Burley tobaccos.

Tobacco growing in British Columbia, F. Charlan (*Canada Dept. Agr., Tobacco Div. Bul. A10, pp. 13*).—This bulletin contains suggestions for prospective tobacco growers in British Columbia.

Notes on the history and changes of varieties of tobacco in Cuba, A. Ponce de Leon (*Estac. Expt. Agron. Cuba Circ. 38, pp. 19–34, pls. 4*).—The author gives historical and botanical notes on each of a number of Cuban tobaccos, and states the relative frequence of their occurrence in the tobacco fields.

How to increase the yield of wheat in California, G. W. Shaw (*California Sta. Bul. 211, pp. 255–316, figs. 28*).—This bulletin summarizes field and laboratory investigations of cereal growing at the California cereal stations at Tulare, Davis, and Ceres, covering several years and in part in cooperation with the Bureau of Plant Industry of this Department.

In 40 trials conducted during 3 years on the university farm at Davis with the average precipitation about 20 in., deep plowing has produced a higher wheat yield than shallow plowing by 8.11 bu. per acre, a percentage increase of 37.40. The barley yield was increased 6.68 bu. per acre or 9.70 per cent, and the succeeding barley crop 8.04 bu. per acre or 46.50 per cent. The importance of summer fallow and a well prepared seed bed are emphasized. Disking as a preparation for spring seeding resulted in a yield of 3.1 bu. per acre more barley than plowing.

In experiments testing the effect of deep plowing and green manuring the land was plowed about 8 in. deep at the time of turning under the crop, then either disked or treated with the subsurface packer. The principal results are stated in the following table:

Effect of deep plowing and green-manure crops on wheat yield.

Preceding treatment or crop.	Average at Ceres, 1909-10.	Yield at Davis, 1907-10.
	Bu.	*Bu.*
Bare fallow	33.3	41.6
Horsebeans (turned under)	37.6	42.7
Canadian field peas (turned under)	36.5	43.3
Wheat after wheat	[a] 15.7	35.6
Rye and vetch (turned under)	54.0	44.4
Rye (turned under)	52.3	....
Bur clover (turned under)	....	48.2

[a] One year only.

The Ceres soil is sandy, that at Davis is heavy, normally richer in humus, and more retentive of moisture. The fourth plat at the Ceres station was summer fallowed in 1906 and produced yields of 41 and 26 bu., respectively, in 1907 and 1908.

Among crops to be used for green manuring the author believes that the most favorable immediate results can probably be secured by the use of rye and that the experiments indicate the determining factor to be the "mass of green stuff that can be introduced into the soil rather than the character of the material." In the Sacramento Valley peas seeded at the rate of about 100 lbs. per acre have given good results but on the lighter soil of the San Joaquin Valley they do not make so rank a growth.

In a fertilizer test at Davis the highest wheat yields, 44.7 and 42.6 bu. per acre respectively, followed applications of (1) 100 lbs. of nitrate of soda, and (2) 100 lbs. of nitrate of soda and 240 lbs. sulphate of potash per acre. The highest barley yield, 22.1 bu. per acre, followed an application of 100 lbs. of nitrate of soda and 2,650 lbs. hydrated lime per acre, while applications of (1) 200 lbs. of nitrate of soda and 400 lbs. superphosphate and (2) 100 lbs. nitrate of soda, 1,000 lbs. superphosphate, and 120 lbs. sulphate of potash per acre were followed by a yield of 18.3 bu. in each case. The general conclusions drawn from this series of experiments are summarized in the following table:

General effect of various fertilizers on 3 years' yields of cereals at Davis.

Wheat.				Barley.			
Fertilizer.	Treated plat.	Check.	Increase.	Fertilizer.	Treated plat.	Check.	Increase.
	Bu.	*Bu.*	*Bu.*		*Bu.*	*Bu.*	*Bu.*
Nitrate of soda	34.30	33.06	1.24	Nitrate of soda	17.1	15.0	2.1
Superphosphate	32.24	33.03	[a].79	Superphosphate	16.7	14.1	2.6
Potash	34.9	34.1	.8	Potash	16.2	15.2	1.0

[a] Decrease.

A table states the results of cooperative tests of superphosphate on oats, wheat, and barley grown on various clay and loam soils.

Drilling was followed by a yield of 6.37 bu. per acre of barley over broadcast seeding. The wheat yield was similarly increased 3.25 bu. per acre or 10.3 per cent. Four years' tests indicate that wheat sown before December 20 produced 4.07 bu. per acre, or 10.14 per cent more than that sown after January 25. The barley yield was increased 14.89 bu. or 30.5 per cent.

Many samples of common wheats about to be used for seed were sieve-graded for comparison against a standard lot of the same variety and the results reported in tabular form. Pinched seed gave a 92 per cent germination test but the plantlets were weak.

Over 50 per cent of the untreated wheat was destroyed by smut in a test in which but 0.33 per cent of that treated with bluestone was lost, 0.98 per cent of that treated with antifungi, a proprietary mixture, 11 per cent with a 1:1,000 sulphuric-acid solution, 0.58 per cent with a 1:500 sulphuric-acid solution. No smutted heads appeared after the use of a formalin solution (1 lb. to 50 gal. of water). These figures represent average results obtained with 5 varieties. A machine for use in treating wheat to prevent smut is described.

Copper sulphate dissolved at the rate of 1 lb. in 2 gal. of water and applied at the rate of 100 gal. per acre killed young mustard and radish plants as well as various other weeds without permanent injury to any cereals. The grain blades turned brown but resumed their usual color within 10 days. One application of iron sulphate at the rate of 140 lbs. per acre killed about 65 per cent of the mustard.

Tables are given showing the yields and more important vegetative characteristics of a large number of varieties and hybrids tested. A test of 12 varieties indicates that "the wheats of spreading type have not equaled the upright growing varieties," and that they are not suited to local conditions in California. The hybrid wheats were mostly of the spreading type and the author regards it as "very doubtful whether they can ever be made desirable wheats for California." In a test of 18 erect-growing wheats at Modesto and Ceres during 1907–10 the highest average yield, 51.4 bu. per acre, was produced by Bolo Blanco, Cereal Investigations No. 2921. In a test of 9 durum wheats during 1908–9 the highest 2 year average, 40 bu. per acre, was produced by Marouani, Cereal Investigations No. 2235–2. In a 3-year test of wheat varieties at Tulare, Theiss Cal. No. 990, produced an average yield of 43 bu. per acre, the highest among the spreading varieties. The highest 3-year average yield of any erect-growing variety was 47.5 bu. produced by the variety Cal. No. 907.

Tables state the result of tests of numerous wheat varieties at Davis and in the Sacramento Valley during 1907–10 in which the results of seeding before and after December 20 were compared.

The Chul and Fretes varieties are discussed as promising wheats for California. Historical and other data relative to them are presented, in part from sources already noted (E. S. R., 16, p. 852; 23, p. 338).

In milling tests Chul proved about 1 per cent higher in gluten than the ordinary California wheats, but was objected to by millers because of its hardness and the fact that its volume "is slightly less than some other wheats. But to offset this, its yield of flour is somewhat greater and the absorptive capacity of the flour is higher." The average yields of Fretes and White Australian wheats at the stations in Stanislaus and Yolo counties were 44.65 and 38.3 bu. per acre respectively, and milling tests showed wet gluten contents of 40 and 38 per cent respectively. Analyses comparing the nitrogenous constituents of 6 varieties are reported.

Memorandum on Indian wheat for the British market, J. Wilson (*Agr. Research Inst. Pusa* [*India*] *Bul. 20, 1910, pp. 40*).—This paper presents studies on Indian wheat for the purpose of increasing the demand for it in the United Kingdom. Tables present statistical data on the imports of wheat into the United Kingdom, exports from India, and wheat production and prices in the 2 countries, and these subjects and the cleanness, purity, quality, uniformity, moisture content, milling qualities, strength, and color of wheats of India are discussed. Suggestions are given to Indian growers and experts, and British millers are urged to establish certain standards as to the wheat which they will receive.

The wheat industry and particularly its organization in France, L. Goulier (*Le Commerce du Blé et Spécialement de son Organisation en France. Poitiers, 1909, pp. 231*).—This thesis gives in part 1 a historical sketch of the commerce in wheat, in part 2 an account of the modern organization of the wheat industry in France, and in part 3 descriptions of the industry in the United States, Russia, and Argentina as exporting countries and of England and Germany as importing countries.

At the present time France is regarded as holding a unique position among nations in that so far as wheat is concerned she provides her own needs only. The tariff protective system, it is maintained, has enabled France to develop agriculture advantageously to the country as a whole, and it is prophesied that under a wise protective policy in the future that country will become a wheat-exporting nation.

A bibliography of French literature on the subject is included.

The distinguishing characters of the seeds of quack-grass and of certain wheat-grasses, F. H. Hillman (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 73, pp. 9, figs. 7*).—The author finds that quack-grass seed is a common impurity of awnless brome-grass (*Bromus inermis*) and certain other commercial seeds, especially those imported from Europe. "The most evident identifying characters of quack-grass and wheat-grass seeds appear in the spikelets and their glumes." Directions are given for distinguishing seeds of quack-grass (*Agropyron repens*), slender wheat-grass (*A. tenerum*), and western wheat-grass (*A. occidentale*), from those of brome-grass.

Injurious weeds common in South Dakota, C. Willis and W. L. Burlison (*South Dakota Sta. Circ. 1, pp. 16, figs. 6*).—This circular deals with the Russian thistle, Canada thistle, wild oats, quack grass, wild buckwheat, and pigeon grass, discussing the damage done to crops, and suggesting remedies.

Seed inspection (*Maine Sta. Off. Insp. 28, pp. 125–140*).—A discussion of seed analysis is followed by tables stating the results of purity tests of samples taken in 1910 and the frequency of occurrence in these samples of each of 81 kinds of weed seed.

Testing farm seeds in the home and in the rural school, F. H. Hillman (*U. S. Dept. Agr., Farmers' Bul. 428, pp. 47, figs. 32*).—A discussion of seed trade conditions and the purposes of seed tests is followed by detailed directions for making purity and germination tests on each of the principal kinds of grass, grain, and clover seeds, and for making or securing the apparatus used.

HORTICULTURE.

The manuring of market-garden crops, B. Dyer and F. W. E. Shrivell (*London, 1910, new ed. rev., pp. 144, pls. 22*).—The authors have been conducting manuring experiments with vegetables and fruit crops for the past 17 years, the experiments with a number of these crops having run through the whole period. The results for the first 7 years, with an outline of the experiments, have been previously noted (E. S. R., 14, p. 961), and the present report summarizes the results secured for various periods during the 16 years ended in 1909 with cauliflower, cabbage, Brussels sprouts, lettuce, globe artichokes, Jerusalem artichokes, carrots, parsnips, celery, spinach, beet roots, rhubarb, potatoes, onions, leeks, asparagus, lucern, beans, peas, gooseberries, currants, raspberries, plums, strawberries, apples, and cobnuts.

In most cases recommendations are given for manuring the crops, except that in the case of the tree fruits the experiments have not been continued sufficiently long to warrant general conclusions. The results of the experiments as a whole appear to largely support those previously noted. While the use of manure is advantageous to a number of crops, a large portion of the manure can be economically replaced by cheaper commercial fertilizers.

The farmer's vegetable garden, W. H. Wicks (*Idaho Sta. Bul. 69, pp. 49, figs. 10, dgms. 2*).—The record for 2 years is given of a ½-acre vegetable garden established in the spring of 1908 on the horticultural grounds of the Idaho Station for the purpose of securing definite data on methods of culture, yield, cost of production, and the advisability of maintaining such a garden on the farms in Idaho.

The value of the products from the ½-acre in 1908 was $82.19 with net profits of $57.41; the corresponding value in 1909 was $98.38 with net profits of $79.22. The conclusion is reached that by judicious arrangement of the garden a continuous supply of vegetables may be secured throughout the season. A plan is given of a farmer's vegetable garden, together with cultural suggestions on farm garden crops and recommended varieties.

Export of cucumbers (*Agr. Jour. Union So. Africa, 1 (1911), No. 1, p. 7*).—According to this item experimental shipments of cucumbers from Natal to England proved a complete failure and the exportation of this crop from South Africa to England is considered impracticable.

Selected strains of nursery stock (*New England Homestead, 62 (1911), No. 12, pp. 471, 472*).—The opinions of several leading horticulturists are given relative to the value of selected scions for the propagation of nursery stock with special reference to the breeding of so-called pedigreed fruit trees.

Contribution to the physiology of the graft.—Influence of the stock on the scion, G. Rivière and G. Bailhache (*Jour. Soc. Nat. Hort. France, 4. ser., 12 (1911), Feb., pp. 95, 96*).—In continuation of previous investigations (E. S. R., 20, p. 1131) the results are given of experiments with pears of a number of varieties grafted on the quince and on seedling stock. Analysis of the must of fruits from these various grafts showed that its density is slightly higher for all the varieties of fruits harvested from the scions grafted on quince than from those grafted on seedlings. The total sugar content and the proportion of saccharose and of acidity are likewise more elevated. The results as a whole indicate that the stock either increases or lessens the faculties of the scion.

Cleft grafting, C. O. Couts (*Newcomerstown, Ohio, 1910, pp. 48, pls. 8*).—A popular treatise on cleft grafting.

Cold storage, precooling, and shipping deciduous fruit, A. V. Stubenrauch (*Proc. Oreg. State Hort. Soc., 25 (1910), pp. 31–38*).—The author discusses the various factors having important influences on the keeping quality of fruit products, as determined in the fruit storage investigations conducted by the Bureau of Plant Industry of this Department (E. S. R., 20, p. 840) during the past 8 years.

The following factors are considered: The place of production, method of culture, seasonal influence, proper stage of maturity for storing, influence of handling on keeping quality, and influence of prompt cooling.

The precooling of fruit, A. V. Stubenrauch (*Cal. Fruit Grower, 43 (1911), Nos. 1181, pp. 11–14; 1182, pp. 4, 5*).—A popular discussion of the principles and practice of precooling fruit as evolved in the fruit storage and marketing investigations of the Bureau of Plant Industry (E. S. R., 20, p. 840).

The fruits of Germany (*Deutschland's Obstsorten, 1–6 (1905–1910), Nos. 1–18, pls. 144, figs. 54, with descriptive text*).—This serial publication, which is edited by Muller of Diemitz, Grau of Körbelitz, and Bissmann of Gotha in cooperation with a great number of German pomologists, comprises descriptive accounts of German fruits. It was issued for the first time in 1905, and consists of annual sets of 3 parts each, with descriptions of 4 varieties of fruit in each part. Under each variety is given its ripening period, name, history, a technical description of the fruit, the important characteristics of the fruit and tree, and the commercial importance and uses of the fruit, together with any unfavorable qualities.

The annual sets thus far noted take up varieties of apples and pears. The full page color plates showing the twig and fruit, including transverse and radial sections, together with the half-tone plates showing the character of the tree growth, are important features of the work.

The apple in Pennsylvania: Varieties, planting, and general care, J. P. STEWART (*Pennsylvania Sta. Bul. 106, pp. 3–20, figs. 3*).—This bulletin comprises a résumé of observations on apple culture in Pennsylvania made by the author in connection with the orcharding investigations being conducted by the station in cooperation with apple growers in different parts of the State, a report on which progress has been noted (E. S. R., 23, p. 341).

The following phases are discussed: Securing early returns, cultural methods and fertilization, purchase and planting of trees, forming the heads and pruning, protection of trees, spraying, thinning, picking, handling, and packing of apples, soils, and varieties. In the descriptive list of varieties the relative commercial importance is indicated, and the varieties are further grouped according to their value in different sections of Pennsylvania and according to their period of maturity.

The avocado in southern California, F. W. POPENOE (*Pomona Col. Jour. Econ. Bot., 1 (1911), No. 1, pp. 3–24, figs. 13*).—With the view of eliminating the loss which frequently occurs in the establishment of a new industry from the planting of useless varieties, the author has brought together notes on the culture and varieties of avocados in southern California. A list is given of the varieties known in California arranged according to general characters and possible usage, together with a provisional key and descriptions of practically all the varieties in cultivation in California and elsewhere.

A new plum from the lake region of Florida, R. M. HARPER (*Torreya, 11 (1911), No. 3, pp. 64–67*).—The author describes a dwarf plum discovered in the vicinity of Tavares, Fla., in 1909, and for which he proposes the name *Prunus geniculata*.

Contributions to the history and bibliography of the roselle, P. J. WESTER (*Bul. Torrey Bot. Club, 38 (1911), No. 2, pp. 91–98, figs. 2*).—This consists of notes on references to the roselle (*Hibiscus sabdariffa*) in early botanical literature.

Tea culture in the Preanger Regency, LOVINK (*De Theecultuur in de Preanger Regentschappen. Buitenzorg: Govt., 1910, pp. 44, pls. 5, dgm. 1, map 1*).—This embraces the results of an investigation by the Department of Agriculture of the Dutch East Indies relative to the native tea industry in the Preanger Regency. It briefly reviews the history of tea culture and experiments conducted to improve the industry, describes and studies the native methods of culture, and suggests methods for improving the industry from an economic and cultural standpoint.

A handbook of tropical gardening and planting with special reference to Ceylon, H. F. MACMILLAN (*Colombo, Ceylon, 1910, pp. XII+524+XVI, figs. 151*).—This work includes practically all commercial and ornamental cultures in the Tropics.

Section 1, which deals with the principles of gardening, discusses in detail climate, soils, plant life and nutrition, plant food, soil bacteria, etc., manures, green manuring, soil operations, propagation, cultural operations, garden and estate tools and implements, and laying out a garden; section 2 contains descriptions of and cultural notes on tropical, subtropical, and temperate fruits and vegetables suitable for planting at different elevations, spices of the Tropics, condiments and seasoning herbs; section 3 deals in a similar manner with the materials for ornamental and protective planting in the Tropics, including trees, shrubs, herbaceous perennials, annuals, biennials, tuberous plants, orchids, ferns, water plants, sand-binding plants, etc.; and section 4 takes up the standard and minor products of Ceylon, as well as a number of miscellaneous products such as drugs, oils, dyes, fibers, guttahs, tans, vegetable-wax, etc. Consideration is also given to perfume-yielding plants, honey plants, ornamental or curious seeds, pasture, grazing, and fodder plants, edible herbs and flowers, garden and estate enemies and friends, insect pests and fungus diseases with remedial measures, transport and packing of plants, seeds, flowers, etc., storing of seeds, useful references, and calendars of work for different districts of Ceylon.

To facilitate reference considerable use has been made of tabular forms containing the most essential particulars. A bibliography of works consulted is given.

Landscape gardening.—How to lay out a garden, E. Kemp (*New York and London, 1911, 4. ed., pp. XXII+292, pls. 20, figs. 79*).—The present edition of this English work has been edited, revised, and adapted to North American conditions by F. A. Waugh. It is stated that in revising the work the aim has been to preserve the advice given by the author, except in case of methods which have been outgrown as a result of the general improvement in the art of landscape gardening. Where mere changes in fashion have occurred, the author's views are retained, accompanied by notes on the present American ideas.

The successive chapters discuss the choice of a location, what to avoid, general principles, the several styles, practical considerations, particular objects, special features, various accessories, and practical directions.

Antirrhinums: Their history, culture, and uses, F. W. Harvey (*London [1911], 1. ed., pp. 20, figs. 19*).—A popular treatise on the culture of snapdragons.

FORESTRY.

Sixth conference of the International Union of Forestry Experimental Stations, W. Somerville (*Quart. Jour. Forestry, 5 (1911), No. 1, pp. 45–48*).—A brief report of the conference held in Belgium in September, 1910.

The use of artificial manures in silviculture was the subject of many papers, discussions, and demonstrations. The reports as a whole indicated that fertilizers may be used to advantage on the very poorest classes of soil as a means of enabling young trees to get through the most critical period of their growth. From a purely financial point of view, however, the use of artificial manure is rarely justified.

The discussion relative to the needle-cast disease of Scots and some other pines, which is due to the attacks of a minute fungus, *Lophodermium pinastri*, brought out the fact that the intensity of the attack depends much on the strain of pine grown, and hence the desirability of procuring seeds from disease-resisting strains (E. S. R., 23, p. 652).

Leaf key to the trees of the Northern States and Canada, and a botanical glossary, R. B. Hough (*Lowville, N. Y., 1910, pp. 49, pl. 1*).—In this key, which is intended to be supplemental to more comprehensive manuals and treatises on trees, the aim has been to include normal leaf types of all of the generally accepted native and naturalized trees north of the latitude of the northern boundary of North Carolina and east of the Rocky Mountains. As a further means of identification, brief descriptions of the fruits have also been included.

Forest conditions of the Ozark region of Missouri, S. J. RECORD (*Missouri Sta. Bul. 89, pp. 199–280, figs. 6, map 1*).—This report was prepared by the Forest Service of this Department in cooperation with the Missouri Station with the view of furnishing accurate information concerning the forest resources of the Ozark region for use as a basis for future legislation, taxation, and forest management and of making recommendations for inaugurating a new state forestry policy.

It contains a general discussion of the region relative to its physiography, ownership of land, taxation, industries, and transportation facilities, forest descriptions by counties and by types, second growth and reproduction, silvical descriptions of the most important trees, damage to the forests by various agencies, including destructive lumbering, fire, insects and diseases, wind, and animals, information relative to the various timber and minor forest industries, conclusions and recommendations, and a list of the trees and shrubs of the Ozark region. A map locating the various forest types is appended.

Breeding and use of tree crops, J. R. SMITH (*Amer. Breeders Mag., 1 (1910), No. 2, pp. 86–91*).—A paper delivered before the American Breeders Association in 1910 in which the author advocates the systematic breeding of tree crops from the standpoint of forage for beast and food for man. Suggestions relative to the improvement of various nut trees, mulberries, sugar maples, persimmons, and foreign species, including basket wood, bush forage, paper plants, etc. are given, together with remarks on the adjustment of tree crops that have already been evolved.

Breeding to improve physical qualities of timber, G. L. CLOTHIER (*Amer. Breeders Mag., 1 (1910), No. 4, pp. 261–263*).—In this paper the author points out a number of variations occurring in timber of the same species with the view of stimulating foresters to systematic attempts at improving the physical qualities of timber.

The relative durability of post timbers, J. J. CRUMLEY (*Ohio Sta. Bul. 219, pp. 605–640, figs. 18*).—With the view of determining the relative durability of different kinds of wood in contact with soil, an examination was made of 292 fences, containing 30,160 posts made out of the following kinds of wood: Osage orange, locust, red cedar, mulberry, white cedar, catalpa, chestnut, oak, honey locust, sassafras, and black ash. The fences examined were mostly in Ohio but included a number in Indiana, Illinois, Kansas, and Texas to gain information relative to the hardy catalpa and the Osage orange, which woods have not been used long in Ohio. This bulletin describes the method of procuring data, including the blank forms used, summarizes the data secured showing the kind of timber from which the posts were made, the size of post, the age or time of service, the number sound and rotten, and the percentage of sound posts, and comments on a number of fences that have some point of special interest.

A table based on the data secured is given showing an estimate of the lasting quality of the different kinds of timber. In durability Osage orange appears to be far superior to the other woods. Yellow locust and red cedar come next, followed by mulberry, white cedar, catalpa, chestnut, oak, and black ash. As a rule the durability of honey locusts, sassafras, black walnut, white walnut, and elm are poor. The results obtained in this study tend to show that the durability of timbers such as the chestnut and the hardy catalpa have been overestimated.

Among the facts brought out by the investigation, it was found that large posts usually last longer than small ones of the same wood. It makes no difference which end of the post is put in the ground, except that preference should be given to the sounder or larger end. In stiff clay soil the posts generally rot just beneath the surface of the ground, whereas in porous, sandy, or gravelly soil, they usually rot throughout the buried portion. Posts standing in constantly wet soils last longer than in soils which are alternately wet and dry. Seasoning does not seem to have any marked effect on durability. Timber growing rapidly and in the open is not so good as the same variety growing in the woods. The evidence appears to show that it is not a good time to cut posts just as the tree begins to grow in early spring. The wood at the center of the tree is not so good as that just inside the sap wood. In an average lot of so-called first-class posts on the market a number can usually be selected that are defective, though they may appear sound and firm. The defectiveness is usually indicated by a somewhat darker color than normal, especially near the center of the tree.

Tests of shortleaf yellow pine treated for sap stain (*Engin. Rec., 63 (1911), No. 7, p. 188*).—Average results of static bending tests on natural, sap-stained, and soda-dipped lumber made at the Forest Products Laboratory of the Forest Service of this Department at Madison, Wis., are here given. They indicate that soda dipping to prevent sap stain does not materially affect the strength or surface hardness of lumber.

Communication on the structure and life of spruce roots and investigations on the influence of various cultural practices on the root development, MATTHES (*Allg. Forst u. Jagd Ztg., 87 (1911), Jan., pp. 1–6, pls. 2*).—Numerous citations are made to show that the spruce is a shallow-rooted tree, usually insecurely anchored, and that the root development is influenced by the nature of the soil and food supply. Results are then given of a number of cultural experiments conducted by the author in the establishment of spruce stands on sandstone and shell-lime soils. Chemical fertilizers were successfully used on both types of soil but at too high a cost.

The culture of spruce in connection with locusts and alders has acted very favorably on the root development of spruce. The feeding roots of the spruce attach themselves closely to the roots of the locust, following the locust roots downward throughout their course. The author attributes the principal beneficial effect on spruce when grown in connection with alder to the assimilation by the spruce roots of the dead nitrogen nodules on the roots of the alder.

In afforesting arable lands with spruce, rows of hardy lupines planted between the spruce rows serve to check the extensive development of shallow lateral roots and create a greater number of anchorage roots which follow the downward course of the dead lupine roots. The use of lupines in connection with spruce on moorlands and in clear cuttings in forests considerably increased the top and root development of spruce but at a rather high cost.

The author suggests that the attacks by grubs of May beetles in arable soil may be one of the important causes of root rot and wound rot. With a view to creating a deeper root system and thus preventing danger from mechanical injury, as well as from attacks of grubs, the use of lupines and preliminary plantings of alders is recommended.

Tapping experiments with Kickxia elastica, A. ZIMMERMANN (*Pflanzer, 7 (1911), No. 1, pp. 1–10*).—Tapping experiments with young *K. elastica* trees conducted at Amani, German East Africa, are reported.

The quarter-section method of tapping gave the largest yield, although the author is of the opinion that generally speaking the herring-bone tapping system will give the best results. Profitable tapping operations were conducted with 6-year-old trees. The quantity of latex appears to increase with the age and diameter of the tree, although in some cases slender trees produced relatively high yields. The author points out that trees showing high yields do not necessarily sustain these high yields from year to year, hence in selecting seeds it is advisable to select from trees which show a continuous high yield. No conclusions are thus far drawn as to the damage to the trees from repeated tappings.

Para rubber (Hevea brasiliensis) in Southern Nigeria (*Bul. Imp. Inst. [So. Kensington], 8 (1910), No. 4, pp. 341–346*).—Analyses are reported on samples of rubber secured in 2 series of tapping experiments conducted on young Para trees in 1909. The rubber was quite equal in quality to the plantation Para from Ceylon and Malaya. The yields thus far obtained are promising.

The rubber of Mascarenhasia elastica (*Bul. Imp. Inst. [So. Kensington], 8 (1910), No. 4, pp. 346–352*).—The analyses are given of a number of specimens of *M. elastica* rubber from the East African Protectorate, Pemba, and Portuguese East Africa. The product is of good quality, although no definite information is at hand relative to the commercial possibilities of this species.

Third biennial report of the state forester of the State of California, G. M. HOMANS (*Bien. Rpt. State Forester Cal., 3 (1909–10), pp. 160, figs. 21*).—Chapter 1 of this report contains a general description of forest conditions in California, including notes on species. The succeeding chapters discuss various forest problems, including forest protection in southern California, northern California, and the redwood belt, the proposed state system of fire protection, recommendations regarding tree squirrels, forest management, forest extension with notes on trees recommended for various purposes, the forest laws, and expenditures, with a summary of recommendations.

Report of the state forester of Wisconsin for 1909–10, E. M. GRIFFITH (*Rpt. State Forester Wis., 1909–10, pp. 136*).—This report deals largely with the present forest conditions and recommendations for their improvement along the lines of forest legislation, administration, extension, protection, education, etc.

Annual report of the director of forestry of the Philippine Islands for the period July 1, 1909, to June 30, 1910, G. P. AHERN (*Ann. Rpt. Dir. Forestry P. I., 1910, pp. 25*).—This consists of a progress report of forest operations conducted during the year by the divisions of administration and investigation, including statistics relative to the certification of public lands, utilization of forest products, amounts of important timber species cut, imports and exports of forest products, revenues, and expenditures.

Official proceedings of the division of forestry of the Royal Prussian Ministry for Agriculture, Domains, and Forests, 1909 (*Amtl. Mitt. Abt. Forsten K. Preuss. Min. Landw. [etc.], 1909, pp. IV+47*).—A statistical review for the year, with comparative data for a few previous years, showing the imports and exports of forest products, average prices of timber by volume and species, hunting permits, forest accidents and offenses, the details relative to the administration of domains, forest areas, yields of major and minor forest products, revenues, and expenditures, as well as considerable miscellaneous information.

Forestry, P. P. WELLS (*N. Y. State Ed. Dept. Bul. 479, 1910, pp. 147–158*).—A brief review of various phases of forest legislation enacted in different portions of the United States during 1907–8.

Publications of the Forest Service (*U. S. Dept. Agr., Div. Pubs. Circ. 11, pp. 6*).—A list of Forest Service publications available March 3, 1911, for free distribution.

DISEASES OF PLANTS.

Report of the vegetable pathologist, D. McAlpine (*Rpt. Dept. Agr.* [*Victoria*], *1907–1910, pp. 44–61, pls. 3*).—A brief synopsis is given of the work done during each year for the past 3 years, including experiments, diseases investigated, and publications issued on plant diseases.

Report on the prevalence of some pests and diseases in the West Indies, for the year 1909–10.—I, Fungoid diseases, F. W. South (*West Indian Bul., 11* (*1911*), *No. 2, pp. 73–85*).—The author discusses the principal diseases of the West Indian Islands, especially with reference to their general prevalence and important attacks of local occurrence. Of the more serious and widely distributed diseases the following are noted: Root disease of the sugar cane (*Marasmius* sp.), bacterial cotton boll disease, cacao canker and black rot of the pods, and root disease of the imported varieties of peanuts.

The genus Fusarium, O. Appel and H. W. Wollenweber (*Arb. K. Biol. Anst. Land u. Forstw., 8* (*1910*), *No. 1, pp. 1–207, pls. 3, figs. 10*).—This is a rather elaborate monograph of this genus, in which the authors discuss the previous scope of the genus, methods used in the present investigation, variations in forms produced in culture media, morphology and biology of variant forms, systematic relationships of the known species, the present scope of the genus, and the relationships of Fusarium to higher fruit forms.

In the second part of the monograph, the taxonomic characteristics and relationships of 13 species are discussed, of which 9 are described as new species or new combinations.

The genus Uromyces, II, P. and H. Sydow (*Monographia Uredinearum seu specierum omnium ad hunc usque diem cognitarium descriptio et adumbratio systematica. II, Genus Uromyces. Leipsic, 1910, vol. 2, pp. XIX+145–396, pls. 9*).—This number completes the taxonomic discussion of the genus Uromyces and includes fungus and host indexes of the entire genus.

On the morphology and physiology of the development of Pestalozzia palmarum, H. Leininger (*Centbl. Bakt.* [*etc.*], *2. Abt., 29* (*1911*), *No. 1–3, pp. 3–35, figs. 15, dgm. 1*).—The author found that the spores of this fungus were produced in pycnidia, pseudopycnidia, sori, and singly on the hyphæ, according to the kind of culture media used.

The production of pycnidia is best obtained in liquid media from which a portion of the nutrient substances has been withdrawn. Pycnidia can also be produced by transferring some of the mycelium from the surface of the impoverished liquid culture into a water culture. Pseudopycnidia are formed in the air on a damp substratum and also on a liquid culture which is deficient in richer materials. Mycelium from a liquid culture when transferred to a damp chamber forms pycnidia. The sori and single spores are only produced in liquid cultures, the former in maltose, cane sugar, mannite, galactose, and arabinose, while both sori and spores born singly on the hyphæ are developed in cultures of grape sugar, cane sugar, maltose, and mannite, to which salts containing nitrogen and phosphorus have been added. When the fungus is grown in 10 per cent solutions of citric and tartaric acids, germination and growth are abnormal.

A new host for Claviceps, H. Groh (*Mycologia, 3* (*1911*), *No. 1, pp. 37, 38, fig. 1*).—Attention is called to a species of Claviceps parasitic on *Carex stellulata angustata,* a sedge which constituted a large part of a shipment of wild hay from Quebec, Canada. All attempts to germinate the sclerotia, which resembled both macroscopically and microscopically the ordinary Claviceps sclerotia on grasses, were unsuccessful.

Smut infection experiments with reference to breeding smut-resistant varieties of barley, J. Broili (*Naturw. Ztschr. Forst u. Landw., 9* (*1911*), *No.*

1, pp. 53–55).—A further report (E. S. R., 23, p. 741) is made on infection experiments in which certain varieties of barley showed marked immunity against smut (*Ustilago hordei tecta*).

Wart disease of potatoes (Synchitrium endobioticum), G. T. Malthouse (*Harper-Adams Agr. Col. [Bul.], 1910, Nov., pp. 40, pls. 15*).—This is an extended discussion of the wart disease of the potato as found in England, including the life history of the disease, infection of host, time of infection, spread of the disease, and conditions favoring its development. The results are given in tabulated form of experiments conducted during 1909 and 1910 on resistant varieties and fungicides.

The disease was found to be fairly prevalent over the greater part of England, but limited, however, in most instances to gardens and allotments. The application of raw night soil tended to increase the severity of an attack. In the variety and fungicide trials of 1909 and 1910 no fungicides of any value for controlling the disease were found, but some 24 varieties of potatoes proved to be immune, from which selections suitable for various classes of soils may be made. Some of the immune varieties never produced a good crop unless they were boxed and well sprouted before planting. The disease also developed on apparently sound tubers in storage. The manure from hogs when fed the diseased raw tubers proved capable of infecting healthy soil.

A bacterial disease of potato and tomato, K. Bancroft (*Agr. Bul. Straits and Fed. Malay States, 9(1910), No. 12, pp. 478–480*).—The occurrence of this disease (*Bacillus solanacearum*) on tomatoes in one district of the Malay States is reported.

The leaf-splitting disease of sugar cane (gele strepenziekte), G. Wilbrink and F. Ledeboer (*Meded. Proefstat. Java-Suikerindus., 1910, No. 39, pp. 443–495, dgms. 7*).—The authors describe the characteristics of this disease, and discuss its dissemination, probable causes, the damage done by it, and methods for its control.

The rejection of all diseased canes as seed, and the use of seed canes known to be perfectly sound and of varieties resistant to the disease are advised.

A bacterial disease of swedes, J. H. Priestley and A. E. Lechmere (*Jour. Agr. Sci., 3 (1910), No. 4, pp. 390–397*).—The results are given of a study of a soft rot of swedes. The disease is attributed to the action of an organism, probably *Bacillus oleraceæ*, but so much resembles a disease produced by *Pseudomonas destructans* and is so closely allied to it in many of its cultural characters that the two organisms may prove to be only different growth forms of the same parasitic species.

On the mosaic disease of tobacco, J. A. Lodewijks, Jr. (*Rec. Trav. Bot. Néerland., 7 (1910), pp. 107–129; abs. in Bot. Centbl., 114 (1910), No. 20, p. 518*).—The results are reported of a series of experiments on the effect of light intensity and of different colored lights on this disease.

It was found that tobacco mosaic was neither checked nor cured by lowered light intensity, and that neither diffused nor colored light had any marked effect on the disease when the healthy leaves on the diseased plants were excluded from direct sunlight. When, however, the upper and diseased parts of the tobacco plant were covered, and the lower healthy leaves left exposed to the sunlight, the following results were obtained: With diffused light a checking of the disease occurred, with a red light the disease decreased, and with a blue light a complete cure resulted. The author claims that this is due to the formation of an antivirus in the healthy leaves of the plant which counteracts the virus of the disease.

Gooseberry mildew in Cambridgeshire (*Gard. Chron., 3. ser., 49 (1911), No. 1255, pp. 24, 25*).—Attention is called to the increased spread of this disease during 1910 because of favorable weather conditions. Winter pruning of affected shoots has materially checked the progress of the disease in the spring, with the consequent result that in Cambridgeshire the fruit has remained clean in practically every garden.

Cicinnobolus as a parasite on Sphærotheca mors uvæ, O. OBERSTEIN (*Ztschr. Pflanzenkrank, 20 (1910), No. 8, pp. 449–452*).—Attention is called to the discovery of a species of Cicinnobolus, probably *C. cesatii*, parasitic on the mycelium of the American gooseberry mildew (*S. mors uvæ*). The various species of Cicinnobolus and their fungus hosts are listed, and the suggestion is made that the Cicinnobolus might be of value in checking the spread of the mildew.

Bacterial gummosis and court-noué in the vineyards of Mendoza, J. ALAZRAQUI (*Gomosis Bacilar y Court-noue en los Viñedos de Mendoza. Buenos Aires: Min. Agr., 1910, pp. 33, figs. 6*).—A report is made on the various diseases affecting the vineyards of this district, special attention being given to the prevalence, characteristics, and causes of gummosis and court-noué, which were the most common diseases found. It is stated that gummosis is due to *Bacillus vitivorus*, which causes a clogging of the conducting vessels by the formation of gum.

Intensity of culture and the intensity of the California vine disease in certain Italian vineyards, A. PUGLIESE (*Bol. Arbor. Ital., 6 (1910), No. 2–4, pp. 106–112*).—The author discusses the relationship of this disease to the soil and to the methods of culture used. It is claimed that certain soil conditions associated with the intensive methods of cultivation in vogue have caused a deterioration of the vine resulting in the so-called California disease. The rejuvenation of the vineyards by breeding vigorous hybrids resistant to this disease is recommended.

Combined treatment for the Oïdium, grape mildew, and Botrytis, E. ZACHAREWICZ (*Rev. Vit., 34 (1910), No. 887, p. 671*).—The author describes a combination of sprays and powders for combating these diseases, and gives data as to formulas, and times and methods of application. The spray used was a copper-sulphate mixture, and the powders were sulphur, lime and copper sulphate, sulphur and copper sulphate, and burned plaster, soap, and copper sulphate. About 12 applications are recommended for an ordinary season.

First experiments in the treatment of grapevine mildew in the Bombay Presidency, W. BURNS (*Dept. Agr. Bombay Bul. 36, 1910, pp. 14, pls. 5*).—Tests were made in several localities as to the efficiency of Bordeaux mixture in controlling the mildew. Three applications of a 3:2:25 Bordeaux mixture were given, followed by a fourth application of a 3:2:40 solution. The usual good results were obtained in all of the experiments, but the peduncles were mildewed in some instances, even on the sprayed vines, and the fruit when ripe still had much of the spray on it.

The fight against the mildew in Anjou, P. MAISONNEUVE (*Rev. Vit., 34 (1910), No. 889, pp. 709, 710*).—The results are given of experiments with Bordeaux mixture and oxychlorid of copper in combating the mildew. Four contiguous plats were used, two of which received two applications of the Bordeaux mixture, and two the oxychlorid of copper. For the third treatment the oxychlorid of copper was applied to all the plats, and for the fourth treatment the Bordeaux mixture was used on all four plats.

At the end of the season the advantage was plainly in favor of the two plats which had received the two initial applications of the Bordeaux mixture. On these two plats the leaves were green and in good condition, while on the oxychlorid of copper plats the leaves had yellowed prematurely and many had fallen.

On the treatment of mildew, J. GAGNAIRE (*Rev. Vit., 35 (1911), No. 891, pp. 45, 46*).—The author briefly discusses the ravages of mildew in France during 1910, and concludes from this year's experience that preventive treatments should be many, and of considerable strength, consisting of alternate applications of liquid and powdered mixtures of copper salts, especially during the period of inflorescence and when the seed in the young grapes are hardening.

The physical properties of the grape and resistance to the mildew, J. LAURENT (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 2, pp. 103–106*).—The author claims that the resistance to the mildew increases with the molecular concentration of the sap of the vine, as in a series of experiments it was found that the varieties known to be more or less resistant showed a higher degree of molecular concentration than vines susceptible to the disease. Tests with the potato gave similar results as to resistance against the late blight of the potato.

A new disease of the mulberry, F. BUBÁK (*Ber. Deut. Bot. Gesell., 28 (1910), No. 10, pp. 533–537, pl. 1*).—The author describes as new a fungus, *Thyrococcum sirakoffii*, which forms under the bark of the small branches and twigs of the mulberry (*Morus alba*) black stromatic tubercles which later break through the bark and form irregular black patches on the surface. The mycelium invades both the bark and the bast regions, resulting ultimately in the death of the twigs and of the seedlings which are attacked.

The diseases of the orange, G. GÁNDARA (*Mem. y Rev. Soc. Cient. "Antonio Alzate," 28 (1910), No. 5–8, pp. 155–192*).—Previously noted from another source (E. S. R., 24, p. 157).

Treatment of gum disease, A. F. CALL (*Proc. Fruit Growers' Conv. Cal., 37 (1910), pp. 66–71*).—In an address before the thirty-seventh Fruit Growers' Convention of California the author discusses the probable causes of gummosis in lemon and orange trees, and gives the remedies that he and other citrus growers have found efficient in controlling this disease.

It is claimed that gummosis of the lemon was most common on land imperfectly drained, and on trees around which the sediment had collected. From observations and experiments the author concludes that the formation of gum is due to a deadening of the member, destroying its sap-carrying power and thereby stopping the down-flowing sap, which then collects in pockets under the bark. These pockets of sap remain until they are evaporated, thus forming a gum which later rots the bark. It is claimed that lemon trees can be cured of this disease by cutting drainage furrows for the sap on the trunks about 2 in. apart extending to the limbs, oiling the bark 2 or 3 times at intervals of 2 weeks with some soft animal oil, such as neat's-foot oil, whitewashing the trees, removing the earth and sediment from the foot of the trees, thereby exposing the crown roots to the air, and preventing water from standing around the trees.

The author also claims that by following the remedies recommended for lemons he was able to cure orange trees of gummosis or scaly bark of the orange.

Diseases of the areca palm (Areca catechu).—I, Koleroga or rot-disease, L. C. COLEMAN (*Ann. Mycol., 8 (1910), No. 6, pp. 591–626, pls. 3, figs. 4; Dept. Agr. Mysore, Mycol. Ser. Bul. 2, 1910, pp. VI+92, pls. 16, figs. 6, maps. 2*).—The author gives the distribution of the disease, the results of infection experiments, morphology of the fungus, and methods used for combating it. The disease is limited to the rainy season, which is about 3½ months, and is found in Mysore, North and South Canara, Malabar, and Cochin.

It usually attacks only immature nuts, producing a rot which causes them to drop off soon after the attack, but it occasionally destroys the tops of the trees.

A felty, mycelial mass appears on the base of the fallen nuts, and gradually spreads over the entire surface. In this mass are imbedded numerous oval sporangia of a Phytophthora.

Infection experiments with pure cultures of the fungus were successful in producing the disease in healthy nuts, and also in the leaf sheaths, in the male and female flowers, and in the flower stalks. It is claimed that the infection is produced entirely by zoospores formed in the sporangia, and, according to the gardeners throughout the infected area of Mysore, the spread of the disease is very much favored by weather conditions where rain and sunshine alternate every few hours. This would indicate that the emission of the zoospore is influenced by the sunlight, and therefore a rapid alternation of rain and sunshine would favor the production of zoospores in large numbers, which being absorbed by the raindrops would be carried by the wind from tree to tree. Neither sexual organs nor oospores were found on the diseased nuts or tree tops, but these organs were observed later in laboratory cultures on inoculated areca nuts and on other species of plants inoculated with the fungus. Attempts to cultivate the fungus from old diseased nuts which had remained in the garden for a year were unsuccessful. The successful inoculation of other plants with areca Phytophthora indicate that the fungus has other host plants in the infected area.

After a comparison of the cultures on artificial media and cross inoculations on various hosts of the areca Phytophthora, the cacao Phytophthora, and *P. omnivora*, the author decides that the morphological differences are sufficient to separate the three forms. For the areca fungus, *P omnivora arecæ* n. var. is suggested, while the cacao form is called *P. theobromæ* n. sp.

The natives of Mysore have attempted to control the disease by covering the nuts with dead leaf sheaths which keep off the rain, but this has proved only partially successful. A single application to the nuts of 5:5:50 or 5:5:25 Bordeaux mixture to which has been added a sticker consisting of 2 lbs. of resin and 1 lb. of washing soda boiled in 1 gal. of water, in June just before the monsoon, has proved more effective than the covering. The efficiency of the spray seems to depend upon the quantity of sticker used rather than on the strength of the Bordeaux mixture, as 1 lb. of sticker to every 25 gal. of Bordeaux mixture gave the best results, irrespective of the strength of Bordeaux mixture used.

A preliminary note on the fungus causing the dieback disease of cacao and of Para rubber, K. Bancroft (*Agr. Bul. Straits and Fed. Malay States, 9 (1910), No. 12, pp. 475–478*).—The author claims to have developed the ascigerous stage of this fungus (*Diplodia cacaoicola*) on badly diseased stems of the cacao plant, after keeping portions of the stem in a sealed jar for 6 months.

The perithecia were grouped in a black, erumpent stroma bearing a covering of weak hairs. The perithecial stage of the fungus belongs to the genus Thyridaria (Sphæriaceæ), and is described as *T. tarda* n. sp.

On the formation of diseased heartwood, E. Münch (*Naturw. Ztschr. Forst u. Landw., 8 (1910), No. 11, pp. 533–547, fig. 1; 12, pp. 553–569, fig. 1*).—The author discusses the causes, formation, properties, and physiological functions of pathogenic heartwood.

It is stated that the formation of gum and other decomposition products which produce a brown discoloration of the wood known as false heartwood is due to fungus attacks, wounds, oxidation, and pressure changes. The so-called false heartwood is the first stage of decay due to the attacks of wood-destroying fungi, the mycelium of which secretes a brown substance resembling wound gum in the tissues of the wood. This wound, or protection gum, may also be produced by the oxidation of the contents of dead parenchyma cells.

In the case of the false heartwood of the beech, the wood has not been injured by the presence of the fungus, but on the contrary, is made more durable. If the decay continues, the wood will ultimately be seriously damaged.

The oak Oïdium on the chestnut and beech, R. Farneti (*Riv. Patol. Veg., 4 (1910), No. 16, pp. 241–243*).—Attention is called to the presence of this fungus on both the chestnut and the beech but so far over only very restricted areas.

On the black canker of the chestnut, E. Griffon and A. Maublanc (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 24, pp. 1149–1151; Bul. Trimest. Soc. Mycol. France, 26 (1910), No. 4, pp. 371–381, pls. 3*).—In a discussion of the taxonomic position of the fungus supposed to be the cause of this disease, the authors claim that it is due, at least in part, to *Melanconis modonia*, of which *Coryneum kunzei castaneæ* is only a conidial form and *M. perniciosa* a synonym.

A new polypore on incense cedar, G. G. Hedgcock (*Mycologia, 2 (1910), No. 3, pp. 155, 156*).—The author describes as new *Polyporus amarus*, a fungus which is claimed to be the cause of "pin rot" or "peckiness" in the heartwood of incense cedar (*Libocedrus decurrens*) in California and Oregon.

The death of fir seedlings from Rhizina undulata, Eulefeld (*Naturw. Ztschr. Forst u. Landw., 8 (1910), No. 11, pp. 527–529, figs. 3*).—Attention is called to the dying of nursery seedlings of this tree in circular areas, caused by the progressive centrifugal growth of the soil fungus, *R. undulata*, and to the subsequent occupation of the diseased areas by groundsel (*Senecio vulgaris*).

The dying of pine trees, K. von Tubeuf (*Naturw. Ztschr. Forst u. Landw., 8 (1910), No. 11, pp. 529–533, figs. 2*).—The author discusses a disease of pines which kills out the stand of 35 to 40-year-old trees on large areas. The needles turn yellow, fall off, growth ceases, and finally the entire tree dies, hastened in the later stages by the attacks of wood-boring beetles and the blue-rot fungus.

An examination of the needles and roots of the diseased trees showed no signs of fungus or other parasites. It is claimed, therefore, that unfavorable subsoil conditions have caused the disease. The subsoil is composed of a limy clay, impervious to water in wet weather and in dry seasons becoming flinty. These conditions cause an abnormal horizontal growth and branching of the root system, malformation of the roots, and a consequent general disturbance in the nutrition which finally terminates in the death of the tree.

A new leaf disease of the pine (Pinus sylvestris), E. Münch and K. von Tubeuf (*Naturw. Ztschr. Forst u. Landw., 9 (1911), No. 1, pp. 20–25, figs. 3*).—This is a further discussion (E. S. R., 22, p. 653) of this parasite, *Hendersonia acicola*, in which its morphological and cultural characteristics and the present distribution of the fungus are given.

Witches brooms and branch knots of the stone pine.—II, Twig galls of the olive, oleander, and stone pine, K. von Tubeuf (*Naturw. Ztschr. Forst u. Landw., 9 (1911), No. 1, pp. 25–44, figs. 12*).—In this, the second article on this subject (E. S. R., 22, p. 749), the author reviews the work of various investigators on the galls found on the twigs and branches of the olive, oleander, and stone pine (*Pinus cembra*), and gives the results of studies made of fresh material from the galls of the stone pine.

In the material examined, large colonies of bacteria were found in the diseased areas, a more detailed description of which will be given later.

Rust of Tsuga canadensis, P. Spaulding (*Science, n. ser., 33 (1911), No. 840, p. 194*).—A new species of rust (*Cæoma tsugæ*) on the young shoots and green cones of *T. canadensis* is described.

A new Taphrina on Polystichum lonchitis, S. Herzfeld (*Österr. Bot. Ztschr., 60 (1910), No. 7, pp. 249–254, figs. 8*).—The author describes a new species of Taphrina (*T. wettsteiniana*) which produces brown, turgid excrescences on the leaves of the holly fern in North Tyrol.

The fungicidal properties of liver of sulphur, F. W. Foreman (*Jour. Agr. Sci., 3 (1910), No. 4, pp. 400–416*).—The results are given of experiments on the constituents of liver of sulphur and their fungicidal value.

It was found that the commercial preparations sold as liver of sulphur do not represent a standard product, but vary in solubility, alkalinity, and content of potash. Liver of sulphur contains various oxidation products in addition to free sulphur, sulph-hydrates, sulphid, and polysulphids of either potassium or sodium. Weak solutions of the oxidation products and the other compounds present, except the free alkali soda and to a less extent potassium hydroxid, showed practically no fungicidal properties when tested on the spores of *Botrytis cinerea*.

The conclusion is therefore drawn that the principal fungicide in liver of sulphur is the free alkali present.

A chapter on lime-sulphur sprays (*Proc. Amer. Pomol. Soc., 1909, pp. 112–137*).—At the thirty-first session of the American Pomological Society held at St. Catharines, Canada, in September, 1909, E. Wallace presented a paper on the value of lime-sulphur solutions as fungicides, and W. M. Scott a paper on self-boiled lime sulphur as a remedy for brown rot and scab of the peach. The substance of both papers has been previously noted from other sources (E. S. R., 21, pp. 149, 244; 22, p. 650; 23, p. 150).

In a general discussion of the subject it was claimed that in field experiments a combination of arsenate of lead and lime sulphur gave worm-free and scab-free fruit with no appreciable injury to fruit or foliage. In the discussion of the effects of carbonic acid on lime sulphur, L. A. Goodman, of Kansas City, Mo., gave the results obtained on 2,200 acres of orchard during 1909 by the use of the Niagara gas sprayers and the Niagara lime-sulphur solutions. It was used on peach and apple trees when in full leaf and proved a successful, safe, cheap, and efficient spray in spite of the fact that the carbon dioxid precipitated the sulphur.

Lime-sulphur sprays, J. Barsacq (*Rev. Vit., 34 (1910), No. 885, pp. 601–608*).—A history is given of lime-sulphur mixtures as a fungicide, from their first known use in the United States by Kenrick in 1833 as a remedy for grape mildew to their present use by Scott and others (E. S. R., 21, pp. 149, 244) as a successful spray for the brown rot of the peach and other orchard diseases.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Annual report of the governor of Alaska on the Alaska game law, 1910, W. E. Clark (*U. S. Dept. Agr., Bur. Biol. Survey Circ. 77, pp. 8*).—The experience of the year served to point out several defects in the Alaska game law, attention being called particularly to the failure to provide any open season for game birds north of latitude 62°. The snowfall in southeastern Alaska in the winter of 1909–10 was so phenomenally heavy that it is estimated by some that from 80 to 90 per cent of the deer died from starvation. Details are given in regard to the hunting and shipping licenses issued and of game and game trophies shipped from the Territory. Lists of the game wardens in Alaska and of the licensed guides in the Kenai Peninsula are appended.

The orders of mammals, W. K. Gregory (*Bul. Amer. Mus. Nat. Hist., 27 (1910), pp. V+524, figs. 32*).—Part 1 of this work takes up Typical Stages in the History of the Ordinal Classification of Mammals, and part 2, Genetic Relations of the Mammalian Orders, with a Discussion of the Origin of the Mammalia and of the Problem of the Auditory Ossicles.

The birds of Illinois and Wisconsin, C. B. Cory (*Pubs. Field Mus. Nat. Hist. [Chicago], Zool. Ser., 9 (1909), pp. 764, figs. 947, map 1*).—It is stated that this work includes, so far as known, all species and subspecies of birds which occur in Illinois and Wisconsin, the total number being 398, with descriptions of their various plumages, nests and eggs, and geographical distribution, together with more or less brief biographical notes concerning them. A key to the eggs of the more common species and a bibliography, chronologically arranged, are included.

A systematic and descriptive catalogue of the birds of Argentina, R. Dabbene (*An. Mus. Nac. Buenos Aires, 3. ser., 11 (1910), pp. XIV+513, figs. 87, map 1*).—Part 1 of this volume is devoted to a consideration of the characters that are of value in the classification of birds; part 2 to the geographical distribution of the species that occur in Argentina. A bibliography is appended to both parts and a systematic index, an alphabetical list of the anatomical and other scientific terms used, and an author's index are included.

The echinostomids parasitic in birds, E. Deitz (*Zool. Jahrb., 1910, Sup. 12, No. 3, pp. 265–512, pls. 6, figs. 78*).—Tables are given of the species of echinostomids and their hosts. Representatives of 32 genera are considered and a bibliography arranged in chronological order is appended.

Index-catalogue of medical and veterinary zoology, C. W. Stiles and A. Hassall (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 39, pt. 33, pp. 2509–2582*).—This part lists the literature by authors from W to Werbitzki.

Third annual report of the state entomologist of Indiana, B. W. Douglass (*Ann. Rpt. State Ent. Ind., 3 (1909–10), pp. 266, pls. 2, figs. 138*).—This report includes accounts of Insects Affecting the Apple (pp. 97–127); Insects Affecting the Grape (pp. 194–204); Miscellaneous Insect Notes (pp. 211–221); insecticide formulas (pp. 222–226); and an account of Beekeeping in Indiana, by G. S. Demuth (pp. 227–258).

Report of the state entomologist [of Maine], E. F. Hitchings (*Agr. of Maine, 1909, pp. 283–314, 314 a–314 l, pls. 11*).—This, the author's fifth annual report, briefly discusses the more important insect pests of the year and nursery inspection work. A report by E. E. Philbrook, special field agent in charge of gipsy-moth work, is appended. Thirty-two counties were scouted, 22 being found infested by the gipsy moth.

Report of the entomologist [of Nebraska for 1909], L. Bruner (*Ann. Rpt. Nebr. Bd. Agr., 1909, pp. 227–265*).—Several separate papers are presented in this report, namely, The Gipsy and Brown-tail Moths, and The House-fly and Allies, by L. Bruner; Some Insects which Attack the Planted Seed of Cereals, by M. H. Swenk; Seed Weevils or Bruchidæ, by R. W. Dawson; Some Lepidopterous Larvæ which Normally Feed on Plant-lice, by C. H. Gable; The Economic Value of our Chrysopas, by W. C. Thompson; and The Bedbug, by J. T. Zimmer.

First report on economic biology, W. E. Collinge (*Rpt. Econ. Biol., 1 (1911), pp. VIII+78, figs. 32*).—This report is divided into 6 parts: (1) Animals injurious to farm and garden produce; (2) animals injurious to fruit trees; (3) animals injurious to forest and ornamental trees; (4) plant diseases due to fungi; (5) animal parasites and diseases; and (6) miscellaneous pests.

Among the insects considered at some length are the bulb mite (*Rhizoglyphus echinopus*), which was the source of considerable loss; the crane fly (*Pachyrhina maculosa*), the larvæ of which destroyed tulip bulbs; the pear thrips, which appeared in large numbers in plum blossoms in the Evesham district during 1909 and to a smaller extent in 1910; the bud moth, which became a pest in Midland orchards; and the horse bot-fly, an account of which has been previously noted (E. S. R., 24, p. 165).

Some insects injurious to truck crops.—Notes on various truck-crop insects, F. H. CHITTENDEN (*U. S. Dept. Agr., Bur. Ent. Bul. 82, pt. 7, pp. 85–93, fig. 1*).—In notes on the natural enemies of the Colorado potato beetle mention is made of several insect enemies, namely, *Pterostichus lucublandus*, *Apateticus (Podisus) maginiventris*, *Perilloides (Perillus) bioculatus*, and *Euthyrhynchus floridanus*, and of several wild bird enemies and guinea fowls. Notes follow on the potato stalk-borer, maggots (*Lonchæa longicornis*, *Euxesta nitidiventris*, and *E. thomæ*) affecting yams in the South, notes on the feeding habits of blister beetles (*Epicauta* spp.), and notes on bean and pea weevils, including their European nomenclature.

Insects attacking the sweet potato in Hawaii, D. T. FULLAWAY (*Hawaii Sta. Bul. 22, pp. 31, figs. 10*).—The author here presents an account of the chief injurious insects of the sweet potato in Hawaii, their life history, habits, natural enemies, etc., with suggestions for their control. The sweet potato is one of the most important vegetables grown in the Territory, being cultivated everywhere in gardens and larger areas.

The cutworms that have been reported to attack the sweet potato at times have not been observed by the author. The sweet potato sphinx moth (*Protoparce convolvuli*) often becomes destructive to wild Ipomœa vines, completely stripping the foliage and is at times injurious to sweet potatoes. A parasite (*Pentarthron semifuscatum*) assists in holding it in check. The sweet potato leaf miner (*Bedellia orchilella*) is said to be fairly well held in check by a chalcidid (*Omphale metallicus*), which parasitizes the larvæ. The sweet potato stem borer (*Omphisa anastomosalis*), a species of apparently recent introduction from China, was first observed in Hawaii about 1900 since which time it has been increasing and promises to be a serious pest if not checked by natural enemies. An ichneumon fly (*Pristomerus* sp.) has been bred from the larva but the extent to which it parasitizes the stem borer is not known. The sweet potato leaf roller (*Phlyctænia despecta*), which is common in the mountains on wild species of Ipomœa, has recently been observed to attack sweet potato plants. It feeds on the underside of the leaves, eating through to the epidermis of the upper surface. While at times very injurious, it is usually well controlled by parasites. The author has bred *Limnerium blackburni* from the larvæ of these moths in great numbers. *Chelonus blackburni* and *Chalcis obscurata* also have been bred by Perkins, and a common wasp, *Odynerus nigripennis*, has been observed gathering the caterpillars. The tortricid leaf roller *Amorbia emigratella*, a pest known in Hawaii since 1900, is thought to have been introduced from Mexico. The larvæ have been found by the author on various plants in addition to sweet potatoes. They are parasitized by *Chalcis obscurata*.

There are said to be 2 weevils that attack the tuber of the sweet potato in Hawaii. The smaller species, which is thought to be the West Indian form *Cryptorhynchus batatæ*, is the commoner of the two, the author having found it infesting sweet potatoes from Maui and Oahu, although not generally prevalent. The larger weevil, the widely distributed *Cylas formicarius*, is not very common in Hawaii, though its occurrence at Lahainaluna, Maui, in 1907 brought it into prominence.

Several minor pests of the sweet potato mentioned are *Nesosydne ipomœicola* and *Aloha ipomææ*, 2 common leaf hoppers; *Plusia chalcites*, which attacks the foliage; a mealy bug (*Pseudococcus* sp.); a scale insect (*Saissetia* sp.); and the Japanese beetle (*Adoretus tenuimaculatus*). The leaf hoppers are highly parasitized by Anagrus, Stylops, and Echthrodelphax and are of no importance as pests. Plusia is not very destructive and is heavily parasitized by tachinid flies. The coccids are of no great importance and the Japanese beetle only occasionally becomes troublesome. Beneficial insects mentioned include wasps of the genera Odynerus and Polistes which prey on caterpillars, and several predaceous bugs, including *Œchalia grisea*, *Zelus renardii*, and *Reduviolus blackburni*.

Insects attacking mealies, C. P. VAN DER MERWE (*Dept. Agr. Orange River Colony, Biol. Div. Leaflet 9, pp. 16*).—The species mentioned as attacking growing corn in Orange River Colony are cutworms, the stalk borer (*Sesamia fusca*), and the beard grub or cob worm (*Heliothis armiger*).

The thrips insects of tea, C. B. ANTRAM (*Indian Tea Assoc. [Pamphlet] 3, 1909, pp. 9, pls. 2*).—A serious outbreak of thrips on tea at Darjeeling is reported for 1908. There are 2 species of thrips which occur together on and injure tea plants at that place during the height of the season and a third species that occurs largely in the flowers and to some extent in the buds of the tea plant during the cold weather. These species are referred to as the common, black, and yellow thrips.

"The effect of thrips on the bush is to arrest the growth of the young leaves and shoots to a remarkable degree, the young leaves after a time falling off of their own accord or on being touched, and this has a serious effect in weakening the bush. The leaf is hard and brittle and does not make good tea; in fact it is the general opinion of the local planters that there is a loss of flavor when the bushes are attacked by thrips."

The importance of cooperation in combating these pests is emphasized.

The apple and pear membracids, H. E. HODGKISS (*New York State Sta. Tech. Bul. 17, pp. 81–112, pls. 8*).—The discovery, during the course of investigations of fruit insects, of the presence of eggs in wounds in the bark and in the buds led the author to conduct the studies here reported.

Prior to these investigations the deposition of eggs in the buds was an unrecognized habit of these insects. Two species, *Ceresa taurina* and *C. borealis*, were found to oviposit in the buds, while the buffalo tree hopper (*C. bubalus*) and *Stictocephala inermis* lay their eggs in the bark of the young wood, causing characteristic scars. Five nymphal instars were found in each of the 4 species. The nymphs of these species may be recognized in their different stages principally by the structure of appendages, the character of the spinosity of the body, and the coloration.

The author finds that in general trees and shrubs serve chiefly for the deposition of eggs and as food for the adults, while more succulent foods are necessary to sustain the younger stages. Thus the species breeding on apples and pears depend on succulent weeds and plants for the sustenance of the nymphs, the range of host plants being quite extensive. The injurious species are those which slit the bark during the process of oviposition, trees thus attacked often being stunted in growth and the branches weakened by continual scarification. These injuries are often aggravated by destructive fungi and insects which find lodgment in the wounds. *C. bubalis* is the more destructive to apple and pear wood, while *S. inermis* does not cause injuries of an important nature. The insertion of eggs between the bud scales by *C. taurina* and *C. borealis* appears to have no detrimental influence on the development of the buds. Succulent shoots of pear, when used in the laboratory for food for nymphs, were always girdled about the larger portion of the stem. "Such work is always present on the more succulent food plants, and of these the thistles are apt to show the effects of the girdling most severely."

"The imago appears about the middle of July. In 1908 the first individuals of *C. bubalus* were seen on July 2, but the insects were not numerous until July 20. During the season of 1910 a large number of the adults of *S. inermis* were collected on July 12, but *C. bubalus* and *C. borealis* at this time were rather rare. *C. taurina* was not obtained until July 20, at which time all species were abundant. . . . In general, adults of the species mentioned may be found over a period beginning about the middle of July and ending with the first heavy frost. . . . Specimens of *S. inermis*, which transformed to adults in the laboratory June 30, commenced to lay eggs on July 20. Under natural conditions the earliest oviposition was noticed on August 1, but the egg scars were not abundant until a few days later. . . . During 1908 no eggs of *C. borealis* or *C. taurina* were found until August 24. Adults of *S. inermis* reared in the laboratory usually made 2 egg scars in one evening. Occasionally 4 slits in the bark for the reception of the eggs were cut in 1 day. One individual made 59 scars during July and August in which 252 eggs were deposited. Another female inserted 212 eggs in 39 wounds during the same period. . . . Hatching takes place about April 20, according to the season, and nymphs of the first stages may be found in goodly numbers on apple and pear trees until May 24. . . . The number of days from hatching to maturity of 20 nymphs of *C. taurina* in the breeding cages was 47 days. The first and second instars averaged 8 and 7 days respectively; the third instar 7 days; the fourth instar 9 days; the fifth instar or pupal stage lasted 16 days. These records correspond very well with those of the nymphs growing under natural conditions, which averaged 7 days to an instar."

Egg parasites are said to have been quite prominent during the past 3 years, 2 species having been bred (*Polynema striaticorne* and *Ottys ceresarum*) which attack the eggs of all 4 membracids. The author presents a historical review, technical descriptions of the stages, an account of the habits of the adults, their destructiveness, and a synonymic bibliography, for each of the 4 species.

Clean cultivation to prevent the growth of the hosts of the nymphs is thought to be the most practical and efficient remedy for the prevention of injury by tree hoppers.

The periodical cicada in 1911, C. L. MARLATT (*U. S. Dept. Agr., Bur. Ent. Circ. 132, pp. 6, figs. 4*).—This circular furnishes information concerning the 2 important broods of periodical cicada that will appear during 1911. One of the broods belongs to the 17-year race and extends from New York southward into North Carolina, in general lying east of the Allegheny Mountains. The other is one of the largest brood of the southern, or 13-year, race and covers the lower half of the Mississippi Valley.

Attention is called to the fact that the damage caused by these broods is usually slight, except in the case of newly planted orchards, and that even here, by vigorous pruning back after the cicada has disappeared, much of the injury caused by the egg punctures can be obviated.

Spraying, fumigating, and dipping for the control of San José scale, T. B. SYMONS, L. M. PEAIRS, and E. N. CORY (*Maryland Sta. Bul. 148, pp. 47–81, figs. 3*).—The authors first report briefly upon spraying tests made of 12 lime-sulphur and 8 oil mixtures on apples and peaches. The results indicate that the lime-sulphur solutions when properly applied are as effective as miscible oils in the control of scale on apple. They also show that the standard miscible oils can be employed on apple trees with safety. A comparison of fall and spring treatments seems to show a slight preference for fall treatment.

The fumigation and dipping experiments reported are summarized as follows: "Instantaneous immersion at normal temperature, is the only practical method that can be employed. Spring dipping seems to be inadvisable, because the growth is retarded to a marked extent. Fall dipping with lime-sulphur mixtures gives promise of becoming very useful, as a supplementary treatment for nursery stock. All oils killed or injured the tops of so many of the trees, that they proved useless as dips. Hydrocyanic-acid gas produced no undesirable effects on the growth of the trees. While it can not be considered as a perfect remedy for ridding trees of scale yet it is the best preventative that may be employed. At the same time its power to kill all scale is not constant. It appears that whale-oil soap as a fall dip is promising, but more extensive tests with various types and strengths must be made before definite conclusion can be reached. . . . The results herein recorded have justified further tests of lime-sulphur and whale-oil soap, and experiments with these will be conducted in the fall of 1910."

The terrapin scale, T. B. SYMONS and E. N. CORY (*Maryland Sta. Bul. 149, pp. 83–92, pl. 1*).—This bulletin includes a report of biological studies and control experiments conducted during 1909–10.

While the terrapin scale was known to occur in Maryland in 1898, it was not recognized as of economic importance until 1906, in the fall of which year it was reported from Frederick and Washington counties, its injury in 1 or 2 orchards being quite severe. During the past 2 years it has spread rapidly, so far as known the most serious outbreaks having occurred in Kent, Washington, and Anne Arundel counties. The loss to orchardists is not so much from injury to the trees as to the fruits, due to a black fungus which develops in the honeydew, rendering the fruit unsalable at remunerative prices.

The scale locates on the outer limbs and branches causing them to become stunted and the leaves to drop off. In observations made during 1910, the first larvæ appeared June 4, eggs continuing to hatch for as long as 6 weeks. "The larvæ immediately crawled to the leaves and settled along the midrib and veins, usually on the underside. Here, the larvæ become considerably longer than broad, are translucent, appearing as greenish white spots. Development continues on the leaves, the scales remaining here for about 6 or 8 weeks, the males reaching maturity. They fertilize the females which then return and settle permanently on the underside of the smaller twigs and branches. The first record of their return to the twigs is August 13. Here, the females continue to develop through late summer and early fall, wintering as partially mature insects."

"So far as observed the terrapin scale infests peach, plum, maple, and apple. Peach seems to be its favorite food plant in this State, although we have found plum trees badly infested. Infested twigs of red maple were sent in from Frederick County and the scales were observed on apple twigs taken from a tree that stood in the midst of a badly infested peach orchard." *Coccophagus lecanii*, the parasite most abundant in 1910, was reared from practically every lot of terrapin scale collected though seldom in large numbers, and 2 other chalcidid species, *Aphycus stomachosus* and *Encyrtus* sp., were reared in small numbers.

While experiments conducted in 1906–7 (E. S. R., 19, p. 859) indicated that both miscible oils and lime-sulphur would control the pest, it has since been found that lime-sulphur has but little, if any, effect, the terrapin scale having spread enormously in orchards that have been properly treated annually with this mixture. In experiments conducted in the fall of 1909 and spring of 1910 "soluble oil at the rate of 1:13 proved dangerous when sprayed in the fall, but proved very effective in the spring, with no damage to the buds, either in double or single application. At the rate of 1:20, sprayed when the fruit buds showed pink, no damage occurred to any trees, and the scale was controlled, though not entirely eradicated. Spray-On, at the rate of 1:12, required a double application in order to be effective. No damage to trees. Scalecide, at the rate of 1:10, sprayed in the fall, proved effective in controlling the scale, and showed no damage to the trees. A double application killed the few remaining scale not hit by the fall application, but killed buds and small twigs.

The single spring application killed 45 per cent of the scale, and did not injure the trees."

Spraying experiments in which a 10 per cent solution of kerosene emulsion and Nico Sul 1 : 240 and 1 : 480 were used show that summer spraying for the pest is impracticable, due to injury to the fruit and foliage and to the extended period during which the larvæ are crawling. For the best results it is recommended that standard miscible oils be employed at a strength of 1 : 15, applied to the trees just as late in the spring as is possible before the buds open.

A bibliography of 19 titles relating to the subject is appended.

The codling moth, L. CAESAR (*Ontario Dept. Agr. Bul. 187, 1911, pp. 40, figs. 21*).—The results of a study of the life history and control of the codling moth in Ontario extending over 2 years are included in this general account.

Observations made in 1910 of the date of pupation, length of the pupal stage, and date of emergence of moths in the spring are reported in tabular form. It is said that in 1910 the spring was abnormally warm in the early part and very cold later on. The periods passed in the pupal stage varied from 57 days for larva pupating on April 22 to 14 days for one pupating on June 14, the rearing being made in glass vials out-of-doors under natural conditions of temperature. In 1909 the first moth emerged June 12 and the last July 25; in 1910 the first appeared May 29, the second June 6, and the last July 22. The information presented shows that the moths continue to emerge in spring during a period of about a month and a half, which means that the larvæ continue to hatch out and enter the fruit for a similar period of time. Out of a total of 63 moths for which the date of emergence was kept during the spring of 1910, 35 emerged between June 20 and 25, or 3 weeks or more after the blossoms had fallen. In the author's longevity observations several moths, both of the spring and later brood, lived as long as 10 days, but the greater number died in 3 or 4 days.

In 1910 eggs were first found June 15, at Guelph. It is estimated that for the 2 seasons during which observations were made, approximately 80 per cent of the first brood eggs were deposited on the leaves, 18 per cent on the fruit, and 2 per cent on the twigs. Although eggs were sometimes found 6 or more feet away from the nearest apple, in frequent examinations of fruitless trees situated near trees with fruit, a total of but 2 eggs was discovered. Thirty-six was the maximum number of eggs observed to be deposited by caged moths. The incubation period of the eggs during the early and later part of the season averaged about 10 days. About 7 days were passed in the egg stage during the warmest weeks, although in early August larvæ were observed to hatch out in as soon as 5 days.

The average number of first-brood larvæ entering apples through the calyx was a little more than 75 per cent. Pears were found to have an even higher percentage of calyx entrance than apples, counts for 1909 and 1910 showing 90 per cent entering in this way. The average period passed by larvæ in the fruit during July and August was found to be about 26 days; in September and October 50 or more days may be spent in the fruit. Attention is called to the fact that in many cases the exit hole is situated in a different part of the fruit from the entrance and that the presence of 2 worm holes in an apple does not necessarily indicate that 2 larvæ have entered it.

In banding experiments made on 2 trees in 1909 in which a total of 621 larvæ were collected, 10 times as many came up from the ground as came down the tree, while in observations made on one tree in 1910 in which 150 larvæ were collected, 4 times as many larvæ left the fruit after it fell as before. Observations made in 1909 show that at Guelph the earliest larva leaves the fruit between July 10 and 26. In the Niagara district the date is somewhat earlier and probably ranges from July 4 to 10. Band records for 1909 and 1910 at Guelph show that the largest number of larvæ emerge between August 21 and 31, twice as many having left the fruit in this period as in any other period of equal length. Of 438 larvæ of the first brood collected from under bands on trees at Guelph between July 11 and September 1, 35 or 8 per cent developed and emerged as moths, but as other larvæ had not left the fruit by September 1, the author is of the opinion that 5 or 6 per cent would be nearer the average number that transform there in the fall. These change to pupæ in a week or so after spinning up and about 2 weeks later emerge as moths and lay eggs for a second brood of larvæ. August 1 in 1909 and July 29 in 1910 were the dates of earliest emergence of the new brood of moths from the Niagara district, while at Guelph they did not appear until about a week later. At Stoney Creek 3 newly laid eggs of the second brood were found on August 4 at which time all the first-brood eggs had apparently hatched and the last larvæ had entered the fruit. In summarizing observations made at Guelph, it is found that the maximum time as a larva in the cocoon was 11 days, the minimum 5, and the average 8; the maximum time as pupa 21 days, the minimum 14, and the average nearly 18; and the maximum total time in the cocoon 28 days, the minimum 24, and the average 25¾. At Guelph the last larva pupated on August 5 and emerged August 30. In well-sprayed orchards nearly all the second brood larvæ enter from the side, as those that attempt to enter at the calyx end are killed by the arsenical; in unsprayed orchards it is estimated that an average of about 50 per cent enter by the calyx.

In examinations made during the spring as high as 90 per cent of the larvæ have been found to be destroyed by natural enemies, the chief of which are birds, beetle larvæ (*Tenebrioides* sp.) and diseases. This tenebrionid larva was observed attacking both larvæ and pupæ, the number destroyed being quite large. About 5 per cent of the larvæ were found in the spring to have been destroyed by disease, and a number are also thus destroyed while inside the fruit during the growing season. A small red mite was also observed feeding upon the eggs.

A general discussion of control measures includes brief statements of results obtained from spraying in several orchards. The author concludes that one thorough application immediately after the blossoms fall is quite sufficient for any part of the Province, except Niagara and other districts of about the same temperature, where a second application should be given 3 weeks after the blossoms fall.

The traubenwicklers during fall and winter, J. Dewitz (*Ber. K. Lehranst. Wein, Obst u. Gartenbau Geisenheim, 1909, pp. 201–237, figs. 6*).—The literature relating to the grape-berry moths or leaf rollers *Cochylis ambiguella* and *Polychrosis* (*Eudemis*) *botrana* is reviewed and a bibliography appended.

Notes on a horn-feeding lepidopterous larva from Africa, A. Busck (*Smithsn. Misc. Collect., 56 (1910), No. 8, pp. 2, pls. 2*).—These notes include photographs which show the larval tubes of *Tinea vastella* upon the horns of a water antelope (*Cobus* sp.), collected in British East Africa.

Mosquito extermination in Shanghai, A. Stanley (*Pub. Health* [*London*], *23 (1910), No. 10, pp. 379, 380*).—It is stated that a special staff, which was organized in 1909 for mosquito extermination, succeeded in diminishing mosquitoes in numbers estimated at from 25 to 75 per cent.

Factors in the transmission and prevention of malaria in the Panama Canal Zone, S. T. Darling (*Ann. Trop. Med. and Par., 4 (1910), No. 2, pp. 179–223*).—This paper includes descriptions of the 12 species of anopheline mosquitoes that have been collected in the Canal Zone during the last 5 years, and accounts of methods of collecting larvæ, feeding and breeding out mosquitoes and care of mosquitoes after feeding, biting and infecting experiments, estimation of gametes, method of examining for zygotes and sporozoites, a description of the malarial parasite in the mosquito, notes on the bionomics of anophelines, the effect of salt or sea water on anopheline larvæ, experiments with larvacides, agents destructive to vegetation, grass and algæ, and screening of various meshes, the relative value of wire screening of various composition, based on practical tests and chemical analyses, etc. See also a previous note (E. S. R., 23, p. 561).

"The period of incubation of the ova of *Cellia albimana*, *Anopheles pseudopunctipennis*, and *Arribalzagia* (?) *malefactor* was estimated as about 36 hours under the laboratory conditions. . . . The larval period varies with the species, food, efficient temperature, sunlight, and environment. . . . Mosquitoes bit when not more than 20 hours old. . . . A virgin specimen of *Stegomyia calopus* has lived for 110 days. . . . When virgin anophelines have been given 1 or 2 blood meals 2 or 3 days after emerging they have lived as long as 16 days. . . . Raisins and dates with water furnished the best food for anophelines in confinement. . . . If there be given 1 blood meal the ova may develop even in virgins kept out of contact with males. . . . Some anophelines, under stress of circumstances, may breed in very brackish water. . . . It was found that crude carbolic acid, having a specific gravity not greater than 0.96 or 0.97 and containing about 20 per cent of phenols or tar acids, when made into soap with common resin and an alkali yielded a product which was an ideal larvacide, having excellent diffusing and toxic powers, and at the same time a very efficient germicide."

The rice maggot, J. S. Collier (In *Report of Investigations Concerning Rice. Stuttgart, Ark., 1910, pp. 13–16, figs. 4*).—The author reports that about 8 per cent of the 8,000 acres of rice grown in Arkansas County, Ark., in 1910, were seriously affected by rice maggots. The pest appears when the rice is about 6 in. high and may work on rice of the Honduras variety until the middle of August. The maggots live about 1 in. below the surface of the soil, feeding upon the roots.

From the experiments here reported, it is concluded that "moving water does not seem to be as favorable a condition for the maggots as stagnant water. Rainwater when left stagnant seems to be a better condition for the rice maggot than pumped water if it is also stagnant. Land plowed late in the fall and thoroughly dried in the spring before the rice is sowed and the water pumped on it, seemed to have less maggots than land plowed in the spring, especially if wet. Over 3 in. of water seems to be, or produces, a better condition for greater numbers and greater ravages of the maggot."

An insect pest of cacao in Uganda (*Agr. News [Barbados], 10 (1911), No. 228, p. 26, figs. 2*).—A brief account is given of observations of the life history of the cacao fruit fly (*Ceratitis punctata*) made by C. C. Gowdey. Control measures consist of the use of a sweetened arsenical made of 3 lbs. of sugar, ¼ lb. arsenate of lead, and 5 gal. of water.

The development of a green bottle fly, Mary O. Allen (*Ent. News, 21 (1910), No. 9, pp. 411–418*).—Studies of the life history and habits of this fly extending over a period of 4 summers are reported.

Trypanosomes and tsetse flies, D. Bruce et al. (*Proc. Roy. Soc. [London], Ser. B, 82 (1910), No. B 556, pp. 368–388; abs. in Sleeping Sickness Bur. [London] Bul., 2 (1910), No. 17, pp. 155–161*).—Previously noted from another source (E. S. R., 24, p. 60).

Notes on the warble fly of the reindeer, Œdemagena tarandi, G. H. Carpenter (*Jour. Econ. Biol., 5 (1910), No. 4, pp. 149–156, pl. 1, figs. 12*).—Biological and descriptive notes on *O. tarandi*. The pupal period of a larva squeezed out in May from a reindeer received at the Dublin Zoological Gardens was found to be about 6 weeks.

A note on the preservation of bamboos from the attacks of the bamboo beetle or shot-borer, E. P. STEBBING (*[Indian Forest Dept.] Pamphlet 15, Forest Zool. Ser. 2, 1910, pp. 18, pls. 2*).—A report of experiments with *Dinoderus minutus*.

Technical papers on miscellaneous forest insects.—II. The genotypes of the sawflies and woodwasps, or the superfamily Tenthredinoidea, S. A. ROHWER (*U. S. Dept. Agr., Bur. Ent. Bul. 20, pt. 2, tech. ser., pp. 69–109*).—In this paper the author presents an alphabetical catalogue of the generic names used in the Tenthredinoidea, which includes the name of the author, original reference, type species, and authority for the type. An index to the genotypes follows. He then discusses the synonymy of certain genera and the work of W. H. Ashmead on the Tenthredinoidea, including an alphabetical list of the genera of this superfamily that were described by Ashmead, with the determined synonymy, a bibliography of this author's more important writings on the group, and descriptions of his genera and species.

In the preparation of this paper studies were made of the types of described genera and species in the principal collections of Europe.

Additions and corrections to the genotypes of the sawflies and woodwasps, or the superfamily Tenthredinoidea, S. A. ROHWER (*Ent. News, 22 (1911), No. 5, pp. 218, 219*).—Additions to the bulletin above noted.

A contribution to the knowledge of the galls of Java, W. and J. VAN LEEUWEN-REIJNVAAN (*Rec. Trav. Bot. Néerland., 6 (1909), pp. 67–98, pl. 1, figs. 6; Ann. Jard. Bot. Buitenzorg, 2. ser., 8 (1910), pt. 2, pp. 119–183, pls. 8*).—The first paper deals with the anatomy and development of the gall on *Erythrina lithosperma* made by *Agromyza erythrinæ*. The second paper takes up the development of several galls made by mites.

Gametogenesis of the gall fly, Neuroterus lenticularis, I, L. DONCASTER (*Proc. Roy. Soc. [London], Ser. B., 82 (1910), No. B 553, pp. 88–113, pls. 3*).—The summer (bisexual) generation of this cynipid was originally described as *Spathegaster baccarum*. The galls from which the spring (agamic) generation emerge are lenticular growths found on the underside of oak leaves in October. From these galls the flies hatch out early in April. Since in each case observed only one sex emerged from the balls produced by one fly, although the numbers were small, the author thinks it is justifiable to conclude that every fly of the agamic generation produces eggs of only one sex. Cases of this kind are said to be known in the Aphididæ and in Rotifers but not hitherto, so far as known, in the Hymenoptera.

Concerning the morphology of Trypanosoma franki, P. KNUTH (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 6 (1909), No. 1, pp. 39–45, fig. 1*).—The author concludes that morphologically *T. franki* is most closely related to *T. theileri*.

The development of Trypanosoma lewisi outside the vertebrate host, N. H. SWELLENGREBEL and C. STRICKLAND (*Parasitology, 3 (1910), No. 3, pp. 360–389, figs. 21*).—"From the results of our experiments we may conclude that the development of *T. lewisi* outside the invertebrate host is not confined to one species or genus, but may take place at least in the rat louse [*Hæmatopinus spinulosus*] and the rat flea [*Ceratophyllus fasciatus*], and also (though perhaps more incompletely) in the bedbug. We see further that development needs not always to be combined with longevity in the invertebrate host, but that sometimes life without development may be longer than with it (behavior in the tick [*Ornithodoros moubata*] compared to that in the louse).

"When we compare the behavior of *T. lewisi* in the four invertebrate hosts studied here, we see that the most complete cycle takes place in the flea, where forms are produced which are never found in cultures. In the louse the development may be truly described as a natural culture; in the bug, the development (as far as we could judge by our incomplete experiment) does not even produce all the cultural forms (only the crithidiæ); and last, in the tick the trypanosomes do not develop at all but are only preserved for some time."

Trypanosoma vespertilionis, R. GONDER (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig. 53 (1910), No. 3, pp. 293–302, pls. 2, fig. 1; abs. in Sleeping Sickness Bur.* [*London*] *Bul., 2 (1910), No. 15, pp. 90, 91*).—*T. vespertilionis* was found in about one-fourth of some 400 bats, representing 7 species, that were examined in southern Italy and Istria.

Chemical investigation of best conditions for making the lime-sulphur wash, L. L. VAN SLYKE, A. W. BOSWORTH, and C. C. HEDGES (*New York State Sta. Bul. 329, pp. 405–449*).—The work here described, which is a continuation of the investigations published in Bulletin 319 previously noted (E. S. R., 22, p. 660), has had for its general object a study of the conditions that make it possible to utilize the lime and sulphur most completely. The more important points studied include the conditions under which it is possible to get the largest amount of lime and sulphur most completely into soluble combination; the conditions under which it is possible to produce a lime-sulphur solution containing the largest amount of calcium pentasulphid (CaS_5); the effect of concentration of the lime-sulphur solution by evaporation at boiling temperature; some of the chemical changes occurring in the making of lime-sulphur solutions; the condition favorable to the formation of sediment in lime-sulphur solutions; the efficiency of lime-sulphur solutions in relation to chemical composition; the keeping power of lime-sulphur solutions on standing; analyses of crystals formed in concentrated lime-sulphur solutions; the relation of density of solutions to percentage of sulphur as a basis for dilution; the efficiency of different formulas; and a method for the approximate determination of impurities in commercial lime.

"As a result of the investigation embodied in this bulletin, the following proportions are recommended for making lime-sulphur solutions: Thirty-six lbs. of lime (based on pure lime, CaO), 80 lbs. of high-grade, finely divided sulphur, and 50 gal. of water. When lime containing 95 per cent or less than 95 per cent of calcium oxid is used, more than 36 lbs. must be taken, according to amount of impurities (38 lbs. for 95 per cent lime and 40 lbs. for 90 per cent lime), but no lime should be used containing less than 90 per cent of calcium oxid or more than 5 per cent of magnesium oxid. In boiling the solution, the liquid must not be allowed to drop more than slightly below the 50 gal. level." A method recommended for the approximate determination of impurities in lime is based upon the fact that when 1 part of pure lime and 2 parts of sulphur are boiled with plenty of water for 1 hour, only slight amounts of sediment appear. If the lime contains impurities, these appear as sediment, the amount of sediment being an approximate measure of the amount of impurities.

Experiments with homemade concentrated lime-sulphur mixtures, P. J. PARROTT and W. J. SCHOENE (*New York State Sta. Bul. 330, pp. 451–484, fig. 1*).—"This bulletin deals with the use of homemade concentrated lime-sulphur mixtures in various station experiments during the past 3 years and in 17 volunteer experiments conducted during 1910.

"In the station experiments of 1910 the densities of the clear solution in 21 preparations varied from 22 to 31° B., giving an average of 26½° B. The sediment in 8 samples that were analyzed ranged in quantities from 2.9 lbs. to

21.4 lbs. per barrel. The cost of materials to make a barrel of concentrate was about $3.05 according to the formula.

"The homemade concentrates when used at effective strengths, as determined by hydrometer tests, have given, in the station experiments for the past 3 years, efficient results on the San José scale and blister-mite.

"In the volunteer experiments the densities of the mixtures ranged from 22 to 32.9° B. The cost of materials to make a barrel of concentrate was from $2.10 to $3.50. The amounts of clear solution and sediment varied considerably, but, in the main, preparations of satisfactory densities with moderate amounts of sediment were obtained.

"Of 11 volunteer experiments on blister-mite there are 10 reports of satisfactory results by the use of the homemade concentrate and 1 report of failure. Of 7 experiments on San José scale there are 5 reports of efficient control and 2 reports of partial success, due probably to difficulties in spraying large trees or to the use of mixtures of too low densities. The results on scale emphasize the necessity both of thorough spraying and of using diluted mixtures of efficient strengths to obtain uniform results on this pest. There are 4 reports on spraying with arsenate of lead in a lime-sulphur solution for the codling moth which are inconclusive because of the conditions of the experiments.

"Very dilute mixtures of the homemade concentrate have on the whole proven fairly safe on apple foliage. In a number of orchards slight injuries were noticed on the more tender leaves, especially following the spraying after blossoming. These injuries were generally obscured by the new growth in from 7 to 10 days. Damages of a more serious nature occurred in a few orchards. Dropping of fruit and leaves are noted in 1 experiment. Nearly all reports note relative absence of russeting of apples on trees sprayed with homemade concentrate."

Making and using concentrated lime-sulphur wash, F. H. Hall (*New York State Sta. Buls. 329, 330, popular ed., pp. 12*).—This is a brief review of bulletins Nos. 329 and 330 noted on page 663.

FOODS—HUMAN NUTRITION.

On phosphorus compounds occurring in food materials, A. Rising (*Svensk Kem. Tidskr., 22 (1910), No. 7, pp. 143–150*).—The author discusses organic phosphorus compounds, methods of preparation, and their chemical structure, and reports determinations of the total phosphorus, phosphatids (lecithin, etc.), inorganic phosphates, phytophosphates, nuclein substances, and phosphoproteids in yellow peas, brown beans, rye flour, rice flour, and graham flour.

The chemical composition and structure of phytic acid were especially studied and silver-phytate prepared and analyzed. The results failed to corroborate the formula suggested by Pasternak for anhydro-oxymethylene-diphosphoric acid.

Preparation of the cod and other salt fish for the market; including a bacteriological study of the causes of reddening, A. W. Bitting (*U. S. Dept. Agr., Bur. Chem. Bul. 133, pp. 63, pls. 6, figs. 4*).—Catching codfish, classification, cleaning, storing, dressing, packing, and similar topics are discussed, and data reported regarding the losses in weight, the composition of the salt used in curing, the amount of salt taken up by fish marketed in different forms, the percentage of moisture and salt in fish while curing when different kinds of salt are used, and the variations in moisture and salt content in commercial fish due to season, style of packing, and other conditions.

A special study of the reddening of codfish showed that it is caused by a coccus which occurs in sea water and will grow even on solid salt. For the elimination of this micro-organism increased sanitary conditions are recommended in handling the fish, and detailed suggestions are made for the cleaning of buildings and utensils.

"The fish should be washed by sprays of water or by a machine. The sprays should have sufficient force to do the work well. The present method of pitching the fish into a tank or dory and then out again is not sufficient for cleaning, and, furthermore, it tends to disseminate any organisms which may be present.

"The water used upon the fish or upon anything with which the fish come in contact should be of undoubted purity. The use of harbor water for any purpose can not be justified, as it is filled with the germs which come from emptying the butts and washing fish and docks. It is also apt to be polluted with sewage from the city, as was found to be the case in the investigation here reported. . . .

"The finished product should be held in a reasonably cool place in summer, and when shipped it should be handled under proper temperature conditions as are other meat products. . . .

"Concentrated sulphurous acid should be used as a disinfectant when steam is not available. One part of the acid to 50 parts of water is effectual where much reddening has occurred, and 1 part to 200 parts of water will be effective in preventing growth if used often."

Seasonal variations in the quantity of glycogen present in samples of oysters, J. A. Milroy (*Dept. Agr. and Tech. Instr. Ireland, Fisheries, Sci. Invest., 1907, No. 4, pp. 12, dgms. 8* [*pub. 1909*]).—Samples of oysters from different localities were collected at intervals for a year and the percentage of glycogen determined.

According to the author's summary, "the percentage of glycogen varies to a large extent with the weight or nutritive condition of the oysters. As regards seasonal variations there is a gradual rise in the percentage from the beginning of August until the middle or end of October. This is succeeded by a fall which reaches its minimum about the middle of December. From that period onwards the percentage rises until it reaches its maximum some time between the beginning of April and early in May. The percentage then falls until it reaches its second minimum early in August. The fact that the variations in percentage of glycogen to a large extent run parallel with the variations in weight somewhat masks the seasonal alterations. . . .

"The results appear to indicate that glycogen is being stored from August to October probably as a provision for a period of lessened activity of absorption during the colder months. The second rise in percentage is probably preparatory to an increased functional activity with a correspondingly increased destruction of glycogen during the hotter months of the year."

Basic extractive material in mushrooms (Agaricus campestris), F. Kutscher (*Zentbl. Physiol., 24 (1910), No. 17, pp. 775, 776*).—Arginin, cholin, and betain were isolated and a hitherto unknown base which, judged by analysis, had a formula like histidin plus 3 methyl groups.

The digestibility of cheese, C. F. Doane (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 166, pp. 22*).—Two series of experiments on the digestibility of cheese are reported which represent cooperative work of the Bureau of Animal Industry and the Office of Experiment Stations. In the first series there were 184 experiments with 65 young men serving as subjects, and in the second series about 50 experiments. American cheese made by the regular Cheddar process, with varying amounts of rennet and cured for different lengths of time and ripened under controlled conditions, was used in the tests, as well as a number of other sorts of cheese, with a view to determining whether thoroughness of digestion was influenced by the kind of cheese, by the degree of ripeness, and by similar factors.

In general, cheese of all sorts was found to be very thoroughly digested and little or no difference in the comparative digestibility of cheese at different stages of ripeness was observed. It was also found that different kinds of cheese closely resembled cheese made by the Cheddar process in thoroughness of digestion, and, in general, "that all kinds of cheese, even the very high-flavored and so-called condimental cheeses, have a high food value."

In addition to the studies of the thoroughness of digestion, some experiments were made in which the respiration calorimeter was used. Green and thoroughly ripened cheese constituted part of the diet with a subject sometimes at rest and sometimes engaged in hard labor. The results obtained, like those of the digestion experiments, also showed "that cheese, both green and cured, was in all respects a good food product."

In none of the investigations reported were physiological disturbances noted, and contrary to the usual opinion, cheese was not found to cause constipation.

In the author's opinion, while experiments have furnished data regarding some debatable questions, such as the comparative digestibility of green and cured cheese, "perhaps the most valuable result has been in showing clearly the great value as food of all the more common varieties of cheese. . . .

"Cheese can no longer be discriminated against because of a suspicion that it is not a healthful food. The absolute lack of any disturbance of the general health of the subjects used in the experiments reported in this bulletin is proof that cheese can be eaten in large quantities without danger to health."

Lard substitutes, D. WESSON (*Bul. Interstate Cotton Seed Crushers Assoc., 1911, No. 13, pp. 3–7, figs. 4*).—Information is summarized regarding the process of refining cotton-seed oil on a commercial scale for use in making lard substitutes and in other ways.

Table salt, A. MCGILL (*Lab. Inland Rev. Dept. Canada Bul. 220, pp. 27*).—The author reports the results of an examination of 273 samples of table salt collected throughout the Dominion of Canada. It is pointed out that there is no legal standard for salt in Canada, but judged by the standard adopted in the United States 215 of the samples are to be regarded as normal. Of the remainder, 39 contained an excess of material insoluble in water, "usually starch, carbonate of lime, or other harmless matter, evidently introduced to render the salt less hygroscopic."

[Miscellaneous food topics], E. F. LADD and ALMA K. JOHNSON (*North Dakota Sta. Spec. Bul. 27, pp. 227–242*).—Data are included regarding the examination of catsup, ice cream, canned goods, and miscellaneous food materials, wines, and illuminating oils, and a special examination of canned tomatoes with reference to the net weight and the proportion of water and solids.

The authors discuss and comment unfavorably on enzym flour, a material which it is claimed will give "a larger loaf of bread and a whiter loaf" if added to flour. According to the authors, this material contains: Water, 5.93 per cent; flour (starch), 37.52 per cent; ammonia acid phosphate, 56.34 per cent; calcium, a trace; and sodium, a trace.

"All tests thus far have given negative results for any appreciable amount of enzym. Further tests are to be made for any possible enzym which may be present."

Information is given regarding the inspection of packing houses, slaughter-houses, etc., under the state law, and a number of miscellaneous food topics are discussed.

[Miscellaneous food topics], E. F. LADD and ALMA K. JOHNSON (*North Dakota Sta. Spec. Bul. 28, pp. 243–254, 255–258*).—Data are summarized regarding the examination under the state law of samples of molasses, pickles, sardines, canned goods, sauerkraut, and miscellaneous food materials, spirits of peppermint, and hydrastis.

The water analysis work of the chemical department is briefly summarized, and information given regarding the development of the cracker and ice cream industry in North Dakota since the pure food law has been in effect.

The bulletin also contains discussions of a number of miscellaneous topics connected with food and drug inspection work.

[Miscellaneous food topics], E. F. LADD and ALMA K. JOHNSON (*North Dakota Sta. Spec. Bul. 29, pp. 259–286*).—Miscellaneous food topics are discussed and information collected by correspondence is summarized regarding the enforcement of state and local enactments as to meat and milk inspection.

[Miscellaneous food products] (*Maine Sta. Off. Insp. 27, pp. 97–124*).—Data regarding the examination of a large number of samples of bottled carbonated beverages and of samples of ice cream are reported and discussed in relation to the requirements of the state food and drug law.

Report of analyst, J. O. HALVERSON (*Bul. Dept. Food and Drug Insp. Mo., 2 (1910), No. 10–11, pp. 20*).—Of 32 samples of cider vinegar, olive oil, milk, dairy products, and other food materials examined, 18 were found to be adulterated or misbranded.

Annual report of the state pure food and drug commission, J. C. MAHR (*Bien. Rpt. Okla. Pub. Health Dept., 1 (1909–10), pp. 249–343*).—Information is presented regarding the character and extent of the state pure food work, including both sanitary and inspection work, and the text of the state pure food law is quoted. The reports of the chemist, U. S. Russell, and of E. De Barr on the work of the laboratory division are also included, and details given concerning the examination of a large number of samples of olive oil, vinegar, spices, canned and bottled goods, jams, jellies, extracts, soda fountain products, and other materials.

Report of chemists' analyses, R. FISCHER ET AL. (*Bien. Rpt. Dairy and Food Comr. Wis., 1910, pp. 64–178, pl. 1*).—Details are given of the results of the examination under the state pure food law of 2,031 samples of milk and other dairy products, canned goods, catsups, flour, honey, and other food products, and of drugs, oils, turpentine, and paint.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 717, p. 1; 718, pp. 2; 720, pp. 2; 722, pp. 100; 723, pp. 4; 724–725, p. 1 each; 726–727, pp. 2 each; 730–733, pp. 2 each; 734, p. 1; 735, pp. 2; 736, p. 1; 737, pp. 2; 738–739, pp. 3 each; 740, pp. 2*).—These notices of judgment have to do with the adulteration of tomato pulp, ice cream cones, tomato catsup, egg noodles, and frozen eggs; the misbranding of drug products and vinegar; the adulteration and misbranding of bleached flour, bitters, vanilla extract, cola sirup, extract of "Messina lemon," wine, and flavoring extracts; and the alleged adulteration and misbranding of sugar.

Common American foods, H. S. GREENBAUM (*N. Y. Med. Jour., 90 (1909), No. 5, pp. 212, 213*).—Using standard data the author has calculated the energy supplied by an ounce of a number of ordinary food materials and by several diet lists.

[How the poor classes live in the Dominican Republic], P. E. HOLLAND (*Daily Cons. and Trade Rpts. [U. S.], 13 (1910), No. 135, pp. 938–940*).—In connection with data regarding food supply and food prices information is given with reference to living conditions of the poorer people in the Dominican Republic.

According to the author, the following is an approximate list of the foods consumed per month by the average peon family:

"Four lbs. coffee, 36 cts.; 300 plantains, \$1.50; 20 lbs. brown sugar, 60 cts.; 2 gal. sirup, 40 cts.; 3 lbs. lard (poor), 60 cts.; 150 stalks sugar cane, 75 cts.; ½ lb. smoked herring, 50 cts.; vegetables, 60 cts."

[In a communication supplying additional data the author states that legumes (beans and peas) are an important part of the diet and that natives in the interior and away from market use eggs and chickens and occasionally game birds.]

The compensation and summation of functional activities of the body, M. RUBNER (*Sitzber. K. Preuss. Akad. Wiss., 1910, XVI, pp. 316–324; abs. in Zentbl. Physiol., 24 (1910), No. 16, pp. 762–764*).—As the author points out, the total activity of a living body consists of the sum of the activities of its organs. All of the organs can not function at their highest capacity at a given time since neither the blood supply nor the respiration would suffice for such activities. Therefore, it follows that increased activity of one organ means a certain amount of inactivity on the part of other organs, as is evident from the distribution of blood in different parts of the body when muscular or mental work is performed.

It is not always possible to reduce the activity of any part of the body to its components, since the circulation of the blood in all the different parts of the body can not be quantitatively measured. However, from a study of the phenomena of metabolism it is possible to determine some of the ways in which different processes in the body interact upon each other.

It is known that, in the case of warm-blooded animals, taking food increases the energy metabolized in comparison with that observed in fasting, and that the increase is determined by the kind and quantity of food. The greatest increase is observed when nitrogenous foods are taken and the smallest with carbohydrates. Such differences, however, disappear if the temperature of the subject is lowered. The higher the temperature of the surrounding air the smaller the amount required in fasting for the increase, while in the case of an animal not fasting, an increase in the temperature exercises no special effect upon energy metabolism. Muscular work influences heat production in a way similar to that noted when food is taken, and so the question arises as to whether muscular work is also to be regarded as a compensating function. The increased heat production noted when protein food is taken depends upon the cleavage of nitrogenous foodstuffs, which can not be used as sources of energy in the body. Whether this is the case when muscular work is performed simultaneously, must be determined by experiment, since taking food and muscular work can each influence the distribution of the blood in the body.

Respiration experiments were accordingly undertaken with a man at work and are briefly reported, the different experimental periods including fasting, a carbohydrate diet, and a protein diet. The amount of work performed was measured with an ergostat. When food was taken more energy was metabolized than when the subject fasted, the largest increase being noted when work was performed on a proteid diet, since protein is not a source of muscular energy as is sugar. According to theory, if the taking of food and muscular work are not compensative but simply additive, the increased energy production due to work would be the same in both the dietary conditions noted, notwithstanding the fact that carbohydrate food of itself causes a much smaller energy metabolism than proteid food. Such a condition was observed in the experiments, so it may be concluded that the dynamic increase of energy metabolism and the production of muscular work are functions which must be considered as absolutely unrelated.

Heat regulation was also studied in connection with the experiments reported. In the case of the sugar diet, the increased heat produced was eliminated about equally by radiation, by conductivity, and by perspiration. In the case of the proteid diet, the blood distribution in the epidermis was not adequate for the purpose of heat elimination and practically all the heat was removed by the evaporation of water. The conditions of heat elimination are still more unfavorable when work is performed, since the heat metabolism is correspondingly greater. This explains why proteid diet has a tendency to diminish the production of muscular work when the surrounding temperature is high, as, for instance, in the Tropics.

Gaseous exchange in metabolism when walking on a level, A. Durig (*Denkschr. Math. Naturw. Kl. K. Akad. Wiss. [Vienna], 86 (1909), pp. 242–291*).—The author reports and discusses the results of extended investigations in which the respiratory quotient and other factors were determined in experiments at low and high altitudes.

The results obtained are summarized in the table which follows:

Results of experiments on energy expenditure in walking on a level.

Person.	Energy expenditure per kilogram per meter.	
	Ordinary altitude.	High altitude.
	Small calories.	*Small calories.*
Subject D	0.674	0.592
Subject K	.537	.638
Subject R	.548	.600

According to his general conclusions, in the majority of cases which have been reported an expenditure of from 0.5 to 0.6 small calorie, or on an average 0.55 small calorie, has been noted per kilogram of body weight and per meter of distance covered in walking on a level. Assuming an efficiency of 0.30, the expenditure for walking on a level would be from 0.07 to 0.08 kgm. per kilogram of body weight and per meter of distance covered.

The energy expenditure for walking on a level was greater at a high altitude (Monte Rosa) than at Vienna. The author thinks it probable that the high altitude exercised a specific effect. The experiments reported are discussed at length with reference to the effects of training and other factors.

Gaseous exchange in metabolism when walking up an incline, A. Durig (*Denkschr. Math. Naturw. Kl. K. Akad. Wiss. [Vienna], 86 (1909), pp. 294–347*).—Extended investigations are reported and discussed, the principal factor studied being the respiratory quotient. The incline varied in experiments with one subject from 15.5 to 21.6° and with the other subjects from 15.5 to 16.4°. The experiments constitute part of a series of investigations undertaken at high altitude (Monte Rosa) and the results are compared with those obtained at low altitude (Vienna).

As shown by the results obtained with 4 persons who took part in the experiments, the energy expenditure for continuous walking up an incline was found to be 7.5 small calories per kilogrammeter of the work of climbing and the calculated efficiency 31 per cent. The results of the individual tests show that the energy expended in walking up a given incline was greater at a high than at a low altitude. Other problems are discussed, such as the effect of training on energy expenditure and the differences observed when results obtained with the treadmill are compared with those of experiments made under normal conditions.

Concerning knowledge of nutrition and teaching of this subject in Belgium, A. J. J. VANDEVELDE (*Compt. Rend. Com. Permanente Belge Aliment. Humaine, 2 (1910), pp. 18–36; reprint, pp. 19*).—In an address delivered before the general assembly of the Belgian Permanent Commission of Human Nutrition the author summarizes and discusses data regarding the present condition of matters pertaining to the study of nutrition in Belgium.

ANIMAL PRODUCTION.

General biology, O. HERTWIG (*Allgemeine Biologie. Jena, 1909, rev. ed., pp. XIX+728, figs. 435*).—A revised edition of a book previously noted (E. S. R., 18, p. 651). New material has been added on Mendel's law, graft hybrids, and other topics which have been the object of recent investigations.

International catalogue of scientific literature. L—General biology (*Internat. Cat. Sci. Lit., 6 (1909), pp. VIII+154; 7 (1909), pp. VIII+158; 8 (1910), pp. VIII+138*).—This continues the subject and author catalogue of literature relating to the study of the individual cell and the metabolism, heredity, and development of plants and animals previously noted (E. S. R., 20, p. 159).

A laboratory text-book of embryology, C. S. MINOT (*Philadelphia, 1910, 2. ed., rev., pp. XII+402, figs. 262*).—A revised edition of a work designed primarily for the use of students taking a practical laboratory course in embryology. Besides covering the study of the chick, pig, and human embryos, there are discussions on the vertebrate type, the theories of heredity, and related topics. The final chapter is devoted to preparing embryos for the detailed study of tissues.

The physiology of reproduction, F. H. A. MARSHALL (*London, New York, and Calcutta, 1910, pp. XVII+706, figs. 154*).—This comprehensive treatise on the reproductive organs is intended primarily for biologists, gynecologists, veterinarians, and animal breeders, and also to serve as a foundation for the science of eugenics. The work is confined mainly to the physiology of generation among the higher forms, particularly the mammalia, but reproductive processes of invertebrates are referred to whenever they throw light on the more complex phenomena displayed by the higher animals.

Chapters on fetal nutrition and the metabolism of pregnancy are written by Dr. James Lochhead, and a section on the biochemistry of sexual organs by Dr. William Cramer.

Phases of evolution and heredity, D. B. HART (*London, 1910, pp. XI+259, figs. 10*).—A popular work on this topic, the special contribution of the author being "an intrinsic theory of variation and its transmission," which "puts variation by environment or other causes quite out of the question."

"The primitive germ cells which give rise to the gametes are derived from an early division of the zygote, and travel through the organism to the sexual gland without undergoing any mitosis, that is to say, without variation in their structure. In the sexual gland they undergo mitosis, which means, as I have already explained, variation in the determinants of the unit characters, according to the law of probability. Probably two kinds of ova and spermatozoa are formed then, but what division of unit characters is in this way given is not known [E. S. R., 22, p. 472]. When the gametes unite, we get half of the varied chromosomes thrown off, and then when the zygote with its proper number of chromosomes is formed, we get the phenomenon of Mendelism, by which the unit characters are distributed in the zygote, again according to the law of probability; so that by all this we get in subsequent generations organs following the curve of probability in their anatomical condition and function. What biometricians may make of this speculation I do not know, but the amount of variations that may arise from it seems to me enormous.

"The theory I advance does not clash with mutation."

The variability of lower organisms, H. PRINGSHEIM (*Die Variabilität niederer Organismen. Berlin, 1910, pp. VIII+216; rev. in Science, n. ser., 32 (1910), No. 832, pp. 837, 838; Nature* [*London*], *85 (1911), No. 2155, pp. 501, 502*).—This book contains a summary of investigations of unicellular organisms from the standpoint of the student of variation, heredity, and evolution.

The introduction deals with variation and heredity in a general way. Special topics such as variation in form and structure and breadth of variability relate chiefly to bacteria. The author holds that in certain cases fluctuating variations have shown themselves heritable and give rise to new races. Cases are cited which are thought to prove that direct adaptations have proved heritable. An annotated bibliography of 74 pages is appended.

The law of sex determination and its practical application, LAURA A. CALHOUN (*New York, 1910, pp, 254, pls. 2*).—This book contains a review of many theories of sex, with some additional experiences of the author.

A reply to the note of W. E. Castle entitled "Russo on sex-determination and artificial modification of the Mendelian ratios," A. RUSSO (*Biol. Centbl., 31 (1911), No. 1, pp. 29–32*).—A reply to the criticism of Castle, previously noted (E. S. R., 23, p. 472).

A study of Bermuda grass, C. K. FRANCIS and R. O. BAIRD (*Oklahoma Sta. Bul. 90, pp. 5–19, figs. 5*).—This contains general information on the methods of planting and uses of Bermuda grass, in part derived from previous publications (E. S. R., 14, p. 855; 17, p. 1062).

Chemical analyses of Bermuda hay for 3 successive years after planting were as follows: First year average, water 7.38, ash 9.13, protein 18.72, fiber 21.57, nitrogen-free extract 40.71, fat 2.49 per cent, number of analyses 18; second year average, water 6.52, ash 8.03, protein 11.91, fiber 24.85, nitrogen-free extract 46.60, fat 2.09 per cent, number of analyses 16; third year average, water 10.74, ash 6.43, protein 11.95, fiber 24.15, nitrogen-free extract 44.84, fat 1.89 per cent, number of analyses 13. The protein content was noticeably high, but there was a gradual decrease toward the end of each season. The yield of hay for the first season was 5,850 lbs. per acre, the second year 1,635 lbs., and the third year 1,667 lbs. per acre.

Digestion experiments were made with 3 sheep, in which Bermuda grass constituted the sole ration, with the exception of water and a little salt. The average digestibility was dry matter 54.92, protein 64.19, fat 39.69, nitrogen-free extract 52.71, fiber 58.93, and ash 41.68 per cent.

Investigations of the digestibility and food value of reindeer moss, H. ISAACHSEN (*Tidsskr. Norske Landbr., 17 (1910), No. 6, pp. 287–302*).—The digestibility of reindeer moss was determined in digestion trials with two young goats.

The composition of the feed was as follows: Water 16.32, protein 8.81, fat 2.15, nitrogen-free extract 41.94, fiber 25.27, and ash 5.53 per cent. The following digestion coefficients were obtained when hay of known digestibility was fed with the reindeer moss: Dry substance 55.1, organic matter 55.3, protein negative, fat 58.3, nitrogen-free extract 55.5, fiber 64.6, ash 43.4, and digestible energy 48.3 per cent. In a maintenance ration, 77 per cent of the energy of the total digestible matter and 42.4 per cent of the total energy of the hay fed was utilized. For reindeer moss the corresponding figures obtained were 40.2 and 72.8 per cent, respectively.

The treatment of straw and other by-products to increase their feeding value, B. Bauriedl (*Monatsh. Landw., 3 (1910), No. 5, pp. 129–149, fig. 1*).—A method of increasing the feeding value of straw by treating with solvents under pressure is described in detail. See also a previous note (E. S. R., 21, p. 368).

Studies and experiments with molasses as a feed, with special consideration of the effect of the strontium content of molasses, H. Conrad (*Studien und Versuche mit der Fütterung von Melasse, insbesondere der strontiumhaltigen Melasse. Inaug. Diss., Univ. Bern, 1909, pp. 36*).—Calves were fed molasses in considerable quantities for 82 days with no harmful results. Molasses containing strontium when fed to cows and goats increased the percentage of fat but not the amount of milk. Although small quantities of strontium were recovered in the milk, the flavor or odor of the milk was not affected and such milk was not harmful when fed to nurslings. The urine was free from sugar and protein. Experiments in feeding strontium salts to rabbits indicated that they are less poisonous than is commonly thought.

A bibliography is appended.

Feed stuff analyses (*Md. Agr. Col. Quart., 1910, No. 50, pp. 7*).—Analyses of brewers' grains, dried beet pulp, linseed meal, cotton-seed meal, beef scrap, and proprietary mixed feeds are reported. The text of the Maryland feeding stuffs law is given.

Stock feeds, G. M. MacNider et al. (*Bul. N. C. Dept. Agr., 31 (1910), No. 11, pp. 64*).—Analyses are reported of wheat by-products, cotton-seed meal, corn and oat feeds, rice by-products, alfalfa meal, molasses feeds, dried beet pulp, corn chop, cracked corn, peanut meal, peanut hulls, poultry feeds, and proprietary mixed feeds.

Commercial feed stuffs, H. A. Weber (*Ann. Rpt. Ohio Bd. Agr., 64 (1909), pp. 413–439*).—Analyses are reported of oil meal, cotton-seed meal, dried beet pulp, distillers' grains, malt sprouts, tankage, wheat by-products, corn chop, and proprietary mixed feeds. The text of the state feed stuff law is given.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 728, p. 1; 729, pp. 2*).—These relate to the misbranding of linseed meal and of chick feed.

The theoretical value of feeds, T. Brinkmann (*Fühling's Landw. Ztg., 59 (1910), No. 21, pp. 721–752, dgms. 5*).—This is an attempt to reduce the cost of production of feed, its physiological value to the animal, its value as a fertilizer, and its relation to the market price of other food stuffs to a common basis, by means of mathematics.

The lecithin content of bone marrow of men and domestic animals, A. Bolle (*Über den Lecithingehalt des Knochenmarks von Mensch und Haustieren. Inaug. Diss., Univ. Bern, 1910, pp. 25; Biochem. Ztschr., 24 (1910), No. 3–5, pp. 179–190; abs. in Zentbl. Allg. u. Expt. Biol., 1 (1910), No. 17, p. 607*).—In the embryos of swine the formation of marrow was found to begin a little after the fourth month, and in cattle during the seventh month. Lecithin was found to be a constituent of marrow at all ages of the animal, but is reduced in amount in old animals and in paralytics.

[Live stock in the United States], B. W. Snow (*Orange Judd Farmer, 50 (1911), No. 4, pp. 138, 140, 156*).—A review of the live stock situation during the year 1910, and an estimate of the number and value of domestic animals in the United States January 1, 1911.

Studies on the history, development, and present condition of Allgäu cattle, with special reference to the recent efforts to improve the breed, X. Oettle (*Studien über die Geschichte, die Entwicklung und den heutigen Zustand des Allgäuer Rindes und seiner Zucht unter besonderer Berücksichtigung der neuzeitlichen Zuchtbestrebungen. Inaug. Diss., Univ. Bern, 1910, pp. 80*).—An account of the origin, history, characteristics, and geographical distribution of this breed. Milk yields, body weights, and measurements are given. A bibliography is appended.

Contributions to the knowledge of Shorthorn cattle, M. SCHLAAK (*Beiträge zur Kenntnis des Shorthornrindes. Inaug. Diss., Univ. Bern, 1910, pp. 48*).—The history, characteristics, and geographical distribution of Shorthorns are discussed, with special reference to Shorthorn breeding in northwestern Germany.

Growing feeder steers in western Nebraska, W. P. SNYDER (*Nebraska Sta. Bul. 117, pp. 5–54, figs. 6*).—This is a repetition of an experiment previously noted (E. S. R., 19, p. 1168). A continuous record is given of a mixed lot of 108 good grade steers from December 3, 1907, to August 5, 1910, which were kept in a common pasture in summer and fed different rations in the winter. The feeds tested were alfalfa, prairie hay, and cane hay. The following table contains a summary of the results obtained:

Summary of average gains made by steers kept in a common pasture in summer and fed different forage rations in winter.

Gains and cost data per steer.	Kind of forage ration.					
	Alfalfa.	Prairie hay.	Cane.	Alfalfa and prairie hay.	Alfalfa and cane.	Prairie hay and cane.
Average initial weight.........pounds..	446	450	452	451	451	449
Average gain.......................do....	769	642	723	781	800	715
Average daily gain.................do....	.78	.65	.74	.80	.82	.73
Total cost of steer when sold............	$69.82	$58.89	$59.99	$69.23	$69.26	$60.16
Value per head in Omaha...............	$53.45	$44.97	$51.26	$56.12	$56.96	$50.76

The price of the feeds was estimated as follows: Alfalfa $6, prairie hay $5, and cane $4 per ton, and corn 50 cts. and oats 35 cts. per bushel. The following quotations are taken from the summary:

"The steers that went on grass in the spring thin in flesh increased in weight faster during the summer than the steers that went on grass in good flesh. Steers wintered on alfalfa or a ration one-half alfalfa make much faster gains during the winter than those wintered on prairie hay or cane alone, but do not make as fast gains the following summer. Steers wintered on a ration of alfalfa or one-half alfalfa make a greater gain during the winter and the summer following combined than steers wintered on prairie hay or cane alone. Both yearling and 2-year-old steers lost weight when fed cane or a ration one-half cane and one-half prairie hay. Steers fed alfalfa or a ration one-half alfalfa gained in weight during each winter.

"The value of cattle should be approximately $1 per 100 lbs. more in the spring than in the preceding fall in order that they may pay for their winter feed. . . . The value of alfalfa in comparison with prairie hay or cane is higher when fed to cattle that are to be sold in the spring than when fed to cattle that are to be sold the fall following. With the prices used for feed and cattle in this bulletin it is not profitable to produce steers for the feed lot."

[Slaughter tests of cattalo and caracul sheep], C. D. MURPHY (*Farm and Ranch, 30 (1911), No. 3, p. 7*).—The percentage of dressed to live weight for 3 cattaloes was 68.55, 65.39, and 60.78, respectively. The average dressed weight for 6 bucks that were three-fourths caracul and one-fourth Shropshire was 56.4 per cent.

Sheep of the Constantine Sahara, A. BOQUET (*Bul. Off. Gouvt. Gén. Algérie, 1911, No. 1, Sup., pp. 74*).—A description of the characteristics of the sheep in the province of Constantine in the Sahara, with a general account of the sheep industry in that section.

Sheep and wool for the farmers, J. W. MATHEWS (*Agr. Gaz. N. S. Wales, 21 (1910), Nos. 11, pp. 921–926, figs. 2; 12, pp. 1013–1022, pls. 2, figs. 3, dgms. 3*).—This is mainly a detailed discussion of the value of the different breeds of sheep for crossing for the special purpose of wool production.

Pig raising in Australia, H. D. BAKER (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 25, pp. 410, 411*).—A note on the cooperative enterprises and other efforts recently undertaken to develop the export trade in pork products.

Investigations on the form and strength of the metacarpal bones of horses and the estimation of their value by measuring their circumference, J. HILDEBRAND (*Untersuchungen über Form und Stärke der Metacarpalknochen der Pferde und Feststellung des Wertes der Röhrenumfangmessungen. Inaug. Diss., Univ. Bern, 1909, pp. 37, pls. 6*).—Measurements of the length, circumference, and diameter of the thickness of the wall of the cannon bones of horses are presented in tabular form, and the value of these measurements for estimating the strength of the bones is discussed.

Distribution of licensed stallions in counties of Wisconsin, A. S. ALEXANDER (*Wisconsin Sta. Circ. Inform. 21, pp. 106*).—This contains a list of licensed stallions in each county of the State, a list of American studbooks both certified and uncertified by the United States Government, portions of the text of the Wisconsin laws pertaining to horse breeding, and notes on the improvement in soundness of stallions since the enactment of the stallion law.

The history of the Royal Frederiksborg Stud Farm, J. JENSEN (*Det Kongelige Frederiksborgske Stutteris Historie. Copenhagen, 1910, pp. IX+326, pls. 18*).—The history covers the period from the establishment of the stud in the Middle Ages until its dispersion in 1840.

Our national horse supply, R. E. TURNBULL (*Live Stock Jour. [London], 73 (1911), No. 1919, pp. 34, 35*).—A statistical account of the supply of horses in the United Kingdom for the past 10 years, written from the standpoint of the sufficiency of the supply of army horses.

[Government aid for horse breeding in Great Britain] (*Jour. Bd. Agr. [London], 17 (1911), No. 10, pp. 841–844; Live Stock Jour. [London], 73 (1911), No. 1918, p. 10*).—A note concerning the grant of £40,000 for the ensuing year for the encouragement of light horse breeding in Great Britain as previously noted (E. S. R., 24, p. 203).

Breeding of horses in Australia, H. D. BAKER (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 29, pp. 476, 477*).—A brief account of the horse industry, with special reference to the value of Australian horses for military use in the Philippine Islands.

Opossum farming in Australia, H. D. BAKER (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 27, pp. 438, 439*).—Because of the high price of opossum skins methods of rearing opossums for their fur are described and recommended for the timbered sections of Australia.

The American standard of perfection (*Boston, 1910, rev., pp. 331, pls. 5, figs. 137*).—A complete description of all recognized varieties of fowls, bantams, turkeys, ducks, and geese in America, as revised by the American Poultry Association in 1910.

Farm poultry management, J. E. RICE (*N. Y. Dept. Agr. Circ. 11, pp. 38–51, pls. 12*).—A circular of popular information on breeding, feeding, hatching, rearing, housing, and marketing poultry.

Measurement of body parts, A. A. BRIGHAM (*Rel. Poultry Jour., 17 (1911), No. 12, pp. 1311, 1367*).—In order to correct tendencies to extremes and to establish a definite size and shape for each variety of poultry, it is suggested that in judging poultry the measurements of the body should be taken into consideration. A list of the most desirable measurements is given.

The language of domestic fowls, E. CARPENTER (*Country Life* [*London*], *28* (*1910*), *No. 714, pp. 368, 369*).—A study of the psychical life of fowls, with a list of 23 different notes or cries of fowls and their probable meaning.

A biometrical study of egg production in the domestic fowl.—II, Seasonal distribution of egg production, R. PEARL and F. M. SURFACE (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 110, pt. 2, pp. 81–170, figs. 30*).—A continuation of a previous study of variation in the total annual egg production at the Maine Station (E. S. R., 21, p. 271).

The purpose of the present paper is to analyze the seasonal distribution, the calendar month being taken as a provisional unit as it is not more open to criticism than any other time unit. The same data were used as in Part I, and aside from the following exceptions the biometrical methods used were in general the same. The constants for the monthly egg production were calculated directly from the ungrouped frequency distribution as given in the appendix, and the raw second moment instead of Sheppard's correction was used for calculating the standard deviation. Each month's production for the given year was weighted with the number of birds which made the record. The months in which the egg production was abnormal were not included. A brief discussion of seasonal distribution has been previously noted (E. S. R., 21, p. 273).

Among other results obtained are the following:

"The month of maximum productivity varied in the experiments furnishing the present data with the method of housing. In a closed, warmed house the month of maximum production was April; in a curtain-front house it was March.

"The greatest relative variability in egg production is at the beginning of the laying year (month of November). The month of lowest variability, both absolute and relative, is April.

"The laying year may be divided into four natural periods or cycles with reference to egg production. The first of these periods (roughly November 1 to March 1) is the winter period, wherein egg production is essentially a non-natural (i. e., forced or stimulated) process. The second or spring period (roughly March 1 to June 1) is the natural laying period of the domestic fowl in its normal reproductive cycle. The third (roughly June 1 to September 1) and fourth (roughly September 1 to October 31) periods are not sharply separated from one another. The summer egg production represents in part a natural continuance of the normal breeding season (rearing of a second brood by the wild *Gallus*) and in part a stimulated process. This period is terminated by the molt, which is the characteristic feature of the fourth period."

"So far as there was any change whatever in variability in monthly egg production during the period when selective breeding was practiced, this change was not in the direction of a reduction as a result of the selection, but, on the contrary, there was an actual increase in variability in all but one month of the year, and here the platted variability line did not sensibly deviate from the horizontal.

"The present statistics show no bad effect on egg production in the winter months (November to March) of keeping birds in large and crowded flocks (up to the limits included in the present study). On the other hand, overcrowding tends distinctly to lower summer (and to a smaller extent spring) egg production. It is chiefly as a result of this effect on summer production that the mean annual production is lower in the large flocks.

"There is no evidence that the continued selection for higher egg production practiced during the eight years covered by the experiment produced any increase whatever in the mean egg production of any month in the year. On the contrary, the mean production in all but two of the months actually decreased during the period of selection.

"The present data indicate that only a trifle more than a quarter of the total eggs produced were laid in the winter third of the year (November 1 to March 1). In the first two-thirds of the laying year approximately three-fourths of the total eggs are produced."

These observed facts regarding the character of the distributions of variation are accounted for by an hypothesis which includes the following points:

"Variation or changes in the rate of fecundity in the hen are fundamentally or innately continuous (in the mathematical sense), though the objective manifestation of fecundity is discontinuous, i. e., expressed in discrete units.

"Visible egg production in each individual bird tends to occur in definite cycles or periods of varying length which alternate with nonproductive periods.

"The rate of fecundity (amount of egg production per unit of time, conceived in the sense of the differential calculus) is in any bird at a minimum at the beginning of a cycle of production, increases to a maximum at what may be termed the height of the cycle, and decreases to a minimum (usually quite rapidly) as the end of the cycle is approached.

"Each of the monthly fecundity distributions is compound, and made up of two parts. In one part are included all birds which are well along in a period of laying activity (or cycle of fecundity). The other part includes those birds not laying at all (that is, in a nonproductive condition or period) and those that have just emerged from this condition of zero fecundity and started on a laying cycle.

"(1) The proportion of the whole flock which falls into each of these two classes, and (2) the particular rate of fecundity which marks the boundary between the two classes, are not constant, but, on the contrary, change in a definite and orderly manner in the different parts of the laying year.

"The distribution of frequency within each of the two hypothetical components of the monthly fecundity distributions follows a simple, unimodal skew frequency curve, and the curve describing the entire monthly fecundity distribution is in each case the sum of two skew frequency curves."

First Tasmanian egg-laying competition, R. J. Terry (*Agr. and Stock Dept. Tasmania, Bul. 18, 1910, pp. 15, figs. 6*).—In 28 competing pens of 6 birds each, the average number of eggs laid per bird during the year was 161, and the average cost of food per hen 6s. 9d.

Cooperative marketing of eggs (*Farmer, 29 (1911), No. 5, pp. 154–156, figs. 3*).—An account of the egg-selling associations in Minnesota and Ontario.

Progress of poultry investigations (*New England Homestead, 62 (1911), No. 5, pp. 151, 161*).—An account of the practical nature of the poultry work and progress at some of the state experiment stations.

Some results of castration in ducks, H. D. Goodale (*Biol. Bul. Mar. Biol. Lab. Woods Hole, 20 (1910), No. 1, pp. 35–66, pls. 5, figs. 6*).—Castrated drakes of the Rouen breed retained their secondary sex characteristics, except the ability to assume summer plumage. The spayed ducks assumed, more or less completely, the secondary sexual characters of the drake, but the change was very gradual. It is suggested that the female owes her color to the presence of some modifying element which prevents the development of the male color, and that the modifier may sometimes be responsible for sex limited inheritance.

A bibliography is appended.

A to Z of pigeons and bantams, F. W. De Lancey (*Sellersville, Pa., 1910, pp. 97, figs. 52*).—A popular work.

DAIRY FARMING—DAIRYING.

Manuring for milk, J. F. Blackshaw (*Midland Agr. and Dairy Col. Bul. 1, 1909–10, pp. 10, dgm. 1, charts 2*).—A preliminary report on experiments in improving pastures for dairy cows.

Following an application of lime, 400 lbs. of superphosphate and 150 lbs. of sulphate of potash per acre were applied to a pasture with a rather poor clay soil. The milk produced by the cows pastured on the fertilized lot was at the rate of 84 gal. per acre, valued at £2 2s., in excess of that on the unfertilized lot. The cost of the fertilizer was £1 13s.

Breeding for production in dairy cattle in the light of recent advances in the study of inheritance, R. Pearl (*Agr. of Maine, 1909, pp. 190–200*).—A paper read before the Maine Dairymen's Association in 1909.

It is shown from experiments in breeding plants and poultry that the old method of selecting breeding stock by performance alone does not lead to the results which were formerly supposed to exist. The lesson for the dairyman from these experiments is that in order to improve his stock it must be done not by selecting cows in the "advanced registry" but by selecting bulls which show a large percentage of daughters in the "advanced registry." In this new method of selecting breeding stock it is not the ability to produce milk, but the power to transmit the ability, which is the desideratum.

What gives us the satisfactory dairy cow—"Her breeding," W. W. Marsh (*Ann. Rpt. Wis. Bd. Agr., 1910, pp. 409–420*).—A lecture before the Wisconsin Board of Agriculture in 1910. The difference between show type and producing type is discussed, and it is pointed out that the improvement of the dairy type can only be brought about by breeding animals with an ancestry which shows a great productive capacity.

Investigations on the influence of pasturing and stabling upon dairy cattle, with special consideration of the changes in the epidermis, P. Rieger (*Untersuchungen über den Einfluss von Weidegang und Stallhaltung auf das Milchvieh, mit besonderer Berücksichtigung der Veränderungen der äusseren Decke. Inaug. Diss., Univ. Bern, 1910, pp. 36, figs. 2; Deut. Landw. Tierzucht, 14 (1910), Nos. 26, pp. 305–309; 27, pp. 317–320; 28, pp. 329–332*).—The author records some observations on the differences in the conformation and in the character of the hair between dairy animals at pasture and those kept in the stable.

Milk, its investigation and usage, F. Utz (*Die Milch, ihre Untersuchung und Verwertung. Vienna and Leipsic, 1911, pp. 264, figs. 72; rev. in Molk. Ztg. [Hildesheim], 25 (1911), No. 15, p. 258*).—A general treatise on milk and its properties, based largely on the results of recent investigations.

Market milk and its inspection, W. Bremme (*Ztschr. Fleisch u. Milchhyg., 21 (1910), Nos. 2, pp. 33–41; 3, pp. 68–76; 21 (1911), Nos. 4, pp. 110–118; 5, pp. 152–160*).—This series of articles discusses the chemistry of the composition of milk, the changes caused by bacteria in its transit to the consumer, and methods of official control in order to insure a sanitary product. A bibliography is appended.

A study of some of the spore-bearing anaerobic bacteria in market milk, H. R. Brown (*Ann. Rpt. Bd. Health Mass., 41 (1909), pp. 632–667*).—A bacteriological study of ordinary market milk purchased at small stores which obtained their milk supply from different contractors, who, in turn, received their milk from dairies scattered throughout the State of Massachusetts and neighboring States. The milk was shipped in accordance with legal regulations in refrigerator cars to the contractors, who distributed it to the small dealers in wagons not supplied with cooling arrangements.

The species studied included *Bacillus fecalis bovis*, *B. aerogenes capsulatus* or *B. welchii*, *B. ephemeros*, and *B. pseudo-tetani*. The remaining species were not identified, but their characters are described in detail.

A list of references to previous work on these species by other investigators is appended.

The control of pasteurization, G. KOEHLER and F. O. TONNEY (*Jour. Amer. Med. Assoc., 56 (1911), No. 10, pp. 713–718, figs. 3*).—A bacteriological study of 70 pasteurizing establishments in the city of Chicago.

The results showed that the percentage of bacterial reduction under practical working conditions, as judged by the samples taken directly from the pasteurizers, was, in general, satisfactory for all 5 types of machines examined. There was present, however, in almost all establishments, irrespective of the type of machine used, a very constant and uniform element of recontamination. It is urged that adequate inspection to reduce recontamination to a minimum should be provided for by placing the work in the hands of a trained bacteriologist.

A study of the monthly averages of the bacterial counts of raw milk, pasteurized milk from plants, and pasteurized market samples emphasized the fact that the temperature at which the product is delivered or sold must be subject to control, as well as the process of pasteurizing, if a safe market product is to be supplied to the consumer.

Samples of raw milk taken from railroad platforms during the month of July showed an average of 12,548,000 germs per cubic centimeter.

The milk situation in the city of Metz, H. KUPPELMAYR (*Die Milchverhältnisse der Stadt Metz. Inaug. Diss., Univ. Bern, 1910, pp. 55*).—A study of the production and market conditions of the city milk supply, with suggestions for its improvement. Results of chemical and bacteriological examinations are presented in tabular form.

The dairy industry in ancient times, L. LINDET (*Ann. Inst. Nat. Agron., 2. ser., 9 (1910), No. 2, pp. 203–240; Indus. Lait.* [*Paris*], *36 (1911), Nos. 9, pp. 139–147; 11, pp. 171–180; 13, pp. 213–220*).—A brief history of the use of milk, butter, and cheese as a food, as a therapeutic agent, and as a sacrificial offering.

Contribution to the knowledge and judging of goat's milk, H. HAGER (*Milchw. Zentbl., 7 (1911), No. 1, pp. 19–24*).—This is a preliminary report of a study of goat's milk, undertaken in order to discover methods by which the adulteration of goat's milk and mixtures of the milk of goats and cows can be detected. Analyses are given.

Drying milk (*Molk. Ztg.* [*Hildesheim*], *25 (1911), No. 9, pp. 145, 146*).—Different methods are described.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 719, p. 1; 721, pp. 2*).—These relate to the adulteration of milk, and the adulteration and misbranding of whey product.

What influence has the water content upon the quality of butter? HESSE (*Molk. Ztg.* [*Hildesheim*], *25 (1911), No. 10, pp. 159–162*).—When scored by experts the quality of butter was found to be independent of the water content if the percentage of water ranged between 12 and 16 per cent. It is stated that even these limits can be exceeded and the quality remain unimpaired if the butter is made from good milk and properly handled.

Supposed loss of soluble, volatile acids during the storage of butter, D. CRISPO (*Bul. Soc. Chim. Belg., 24 (1910), No. 12, pp. 436–438; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 2, p. 104*).—Unclarified butters wrapped in parchment paper and inclosed in tin boxes were attacked by molds and suffered a loss of volatile acids until the butter had been stored about 7 months, after which time the butter had become so dry that there was little loss of volatile acids. Butter which had been melted and strained and kept in corked bottles suffered no appreciable loss of volatile acids in 3 years' time, and in some cases there was a slight increase.

The transformation of proteins into fats during the ripening of cheese (preliminary communication), M. NIERENSTEIN (*Proc. Roy. Soc. [London], Ser. B, 83 (1911), No. B 564, pp. 301–304*).—On analysis a Cheddar cheese about 4 years old was found to contain free cholesterol, cadaverin, putrescin, and aminovaleric acid in the ether extract. The increase in fat during the ripening of cheese due to protein cleavage, which has been reported by other observers, is thought to be erroneous and due to considering the entire ether extract as fat. Doubt is also raised concerning protein as a source of fat formation in the animal body.

The control of moisture in cheese, J. L. SAMMIS, F. W. LAABS, and S. K. SUZUKI (*Wisconsin Sta. Circ. Inform. 20, pp. 14, fig. 1*).—This is a popular abstract of Research Bulletin 7, previously noted (E. S. R., 23, p. 383).

VETERINARY MEDICINE.

Thirteenth annual meeting of the Interstate Association of Live Stock Sanitary Boards (*Proc. Interstate Assoc. Live Stock Sanit. Bds., 13 (1909), pp. 165*).—The papers presented and discussed include accounts of the Recent Outbreak of Foot-and-mouth Disease, by A. D. Melvin (pp. 37–44), (E. S. R., 23, p. 84); Mange in Cattle, by P. Juckniess (pp. 48–51); Progress of Live Stock Sanitary Work in Cuba, by N. S. Mayo (pp. 55–57); methods of tick eradication, by C. A. Cary (pp. 58–61); Control of Glanders, by F. S. Schoenleber (pp. 72–74); Veterinary Tetanus Antitoxin, with Special Reference to Federal Supervision of Biological Products, by J. R. Mohler (pp. 78–91), (E. S. R., 22, p. 485); Proper Method of Disposing of the Carcasses of Animals Dying from Contagious and Infectious Diseases, by S. B. Nelson (pp. 91–93); Arsenical Dips for Cattle Ticks, by B. H. Ransom (pp. 95–102); Synopsis of Work of the Various States in Immunizing Against Hog Cholera, by A. D. Melvin (pp. 110–116); Progress of Tuberculosis Eradication Work in Missouri, by D. F. Luckey (pp. 117–119); Nerve Irritation as a Factor in Tuberculosis Extermination, by C. G. Lamb (pp. 119–124); papers on hygienic milk supply, by Q. E. Dyson (pp. 124–128) and W. A. Evans (pp. 128–134); A Plea for More Uniformity of Tuberculin Testing for Interstate Shipment, by S. H. Ward (pp. 135–137); and a discussion of hog cholera and its prevention. A report of the committee on sanitary laws and regulations presented by A. D. Melvin includes a brief summary of the live stock and sanitary laws of the individual States.

Report in regard to veterinary matters in the Kingdom of Saxony for 1909 (*Ber. Veterinärw. Königr. Sachsen, 54 (1909), pp. V+236*).—Among the topics included in this publication are reports in regard to infectious diseases of animals and epizootics, slaughtering of animals and their inspection and insurance, abstracts from the clinical reports of horse diseases in the army, and immunizing tests conducted by the State against tuberculosis with the von Behring and Klimmer methods.

The formation of hydrocyanic acid from linseed cake, G. D. LANDER (*Jour. Bd. Agr. [London], 17 (1911), No. 11, pp. 904–907*).—Feeding tests were conducted with sheep and one heifer. The results are summarized as follows:

(1) A sheep had 1 lb. of the cake (containing 0.025 per cent hydrocyanic acid) per diem for 36 consecutive days, with no result. (2) A sheep had 1 lb. for 31 days, 5 lbs. for 2 days, and after 7 days a further 5 lbs., with no result. (3) A heifer 6 months old had 1 lb. per day of the dry cake for 4 days, 1 lb. per day of the moist cake for 13 days, 2 lbs. per day of the moist cake for 2 days, and 5 lbs. per day of the moist cake for 18 days, and after a 14 days' interval, 5 lbs. per day of the moist cake for 30 days, making a total of 261 lbs. of cake in 67 days containing 456.75 grains of hydrocyanic acid. No definite results having been obtained, the cake was discontinued, and after about 6 weeks pure potassium cyanid was fed as follows: KCN equal to 3.5 grains HCN in ordinary food 4 days, KCN equal to 7.0 grains HCN in ordinary food 1 day, and KCN equal to 10.0 grains HCN in ordinary food 1 day; after an interval of 2 days, KCN equal to 15.0 grains HCN in ordinary food 2 days; making a total of 61.0 grains HCN in 10 days. No obvious results were obtained. Cyanid equal to 22.5 grains of hydrocyanic acid given in a gentian ball and inserted into the rumen produced no result. This was followed the next day by 30 grains fed in a similar manner, and was fatal within 2 hours.

The author considers that linseed cake such as is usually employed is harmless.

Colchicin poisoning from the pasture, J. HALÁSZ (*Állatorvosi Lapok, 33 (1910), No. 3, pp. 25, 26; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 6, p. 106*).—During the months of July, August, and September a cow died almost every day. The stomach contents were analyzed and gave a definite reaction for colchicin. The symptoms and pathological findings are stated.

Distillery slop diseases, J. PAECHTNER (*Ztschr. Spiritusindus., 33 (1910), Nos. 46, p. 563; 48, p. 587; 50, p. 612; 51, p. 625*).—The diseases known as "schlempe mauke" (panaritium) or distillery slop disease, and distillery slop cough, are discussed in regard to their etiology, symptoms, pathology, prevention, and treatment, and compared with other conditions commonly mistaken for them.

Other diseases considered are white scours, infantile paralysis, purulent infection of the umbilicus, and abortion.

The relation of glycogen and its cleavage products to symptomatic anthrax, O. MÖLLER (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 7, pp. 117–119*).—The author points out the relation which the glycogen of the muscles may have to this disease. Rabbits which were fed on much carbohydrate (sugar beets) were not very resistant to infection with this bacillus, while those which were starved were remarkably so. The starved animals rarely showed the typical swellings of the hind thighs, nor did the muscles emit the gritty sound which is so characteristic of symptomatic anthrax.

A new vaccine against blackleg, A. GODOY (*Mem. Inst. Oswaldo Cruz, 2 (1910), No. 1, pp. 11–21, fig. 1*).—The results of laboratory tests with a new vaccine against blackleg are reported. The method of preparing the vaccine is given.

In regard to the occurrence of bacteria resembling Bacillus erysipelatis in the bovine and fowl, R. BROLL (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 3, pp. 41, 42*).—The author isolated bacteria from a steer and a hen which morphologically simulated *B. erysipelatis*, but the bacilli after being inoculated into mice did not yield the pathological changes characteristic of erysipelas. The strain from the hen was very toxic.

The epicrisis to a foot-and-mouth disease invasion, O. KRUEGER (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 52, pp. 1058–1060*).—The author discusses the various factors involved in the epizootiology of foot-and-mouth disease, and points out the part which man may play in the dissemination of the disease. He recommends certain precautionary measures in this direction.

Mastitis caused by a diplococcus, B. MEZEY and I. KOPPÁNYI (*Állatorvosi Lapok, 33 (1910), No. 5, pp. 49, 50; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 5, pp. 77*).—Thirty-six animals in one barn were examined and found to be infected with a diplococcus which grew well upon agar and formed round, gray-white colonies, and which took Gram.

The disease manifested itself by the formation of nodular growths under the subconnective tissue of the mammary gland and which went on to abscess formation. It could be transmitted artificially to other animals. The author believes that the disease originated from infected straw. After applying an ointment consisting of boric acid, silver nitrate, and lanolin, the abscesses healed in 12 days.

Bacteriological investigations in regard to the causative agent of acute mastitis, with particular reference to the cooperation of the bacteria of the meat poisoning group in the production of the disease, ZWICK and WEICHEL (*Arb. K. Gsndhtsamt., 34 (1910), No. 4, pp. 391–445*).—The results of a bacteriological examination of 21 cases of acute mastitis showed that in most instances the disease was caused by micro-organisms of the coli-aerogenes group. The results further show that a septic inflammation of the udder or a classic mastitis can be brought about by the bacteria of the meat-poisoning group.

The lecithin content of milk under pathologic conditions, L. W. FETZER (*Abs. in Science, n. ser., 33 (1911), No. 844, p. 339*).—"The results show that milk obtained from animals suffering from mastitis contains less lecithin than the milk obtained from healthy animals. It was further noted that where a diminution in the lecithin content took place there was a corresponding decrease in the fat content."

In regard to the biological characteristics of colostric and mastitis milks, M. SASSENHAGEN (*Über die Biologischen Eigenschaften der Colostral- und Mastitismilch. Inaug. Diss., Univ. Bern, 1909, pp. 56*).—Colostric and mastitis milks from cows were both found to contain many cellular structures, as well as the protein substances usually contained in blood. Biologically considered, the secretion obtained during the colostric period or from cases of mastitis behave in many respects alike, as bacteriolytic haptines and hemolysins. Complement and antibody substances were practically always present. There were, however, certain differences between colostric and mastitis milks; mastitis milk, for instance, contained many more bacteria and had a higher reducing value for methylene blue, although colostrum during the first few days also has a strong reducing reaction. A further difference is the fact that the Schardinger reaction is obtained with mastitis milk, but not with colostric milk.

The above findings were also characteristic for woman's and goat's milk.

In regard to the so-called pseudorabies, ZWICK (*Arb. K. Gsndhtsamt., 36 (1911), No. 3, pp. 382–408; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 7, p. 810*).—Tests were made with virulent material emanating from Hungary. The brain substance, urine, blood, and blood serum were found to be virulent, but the filtrate from a Berkefeld filter was avirulent. The brain substance was found to be virulent after a period of 8 months. Desiccation and boiling destroyed the virus.

The disease is not contagious, and the incubation time was found to be from 36 to 96 hours, which is different from that in rabies. The author found bodies in the brain tissue which may have something to do with the etiology of this condition, but he was not able to cultivate them.

The cause of puerperal septicemia, OHLER (*München. Tierärztl. Wchnschr., 53 (1909), No. 50; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 52, p. 1052*).—Puerperal septicemia is caused by the *Streptococcus pyogenes*. If other bacteria are taken up by the blood stream, such as those which cause putrefaction, they eventually overwhelm the streptococci and either destroy them or weaken their virulence.

Prevention of intestinal rupture during birth, BECKER (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 41, pp. 794, 795*).—The author describes a method of treating breech cases to prevent intestinal rupture in the mother, which he has employed with good success.

An examination of the feces of forty cattle for tubercle bacilli and conclusions, J. REICHEL and E. S. DEUBLER (*Jour. Med. Research, 24 (1911), No. 1, pp. 5–14*).—This is a preliminary report of investigations conducted under the auspices of the Pennsylvania State Live Stock Sanitary Board.

The conclusions were that "the microscopic examination of the feces or rectal scrapings of cattle for tubercle bacilli is of no value, in that many bacteria make their appearance in the feces or rectal scrapings with the morphology and staining characteristics of tubercle bacilli, which, however, fail to prove themselves as such. 'The animal inoculation test,' i. e., the injection of guinea pigs with feces and rectal scrapings of cattle is a valuable although not an infallible test. It can be relied upon when the guinea pigs injected develop tuberculosis as a result of the injection.

"Feeding material suspected of containing tubercle bacilli to guinea pigs has shown itself of little value, in that only 3 (20 per cent) of the guinea pigs fed feces with tubercle bacilli developed tuberculosis. Of the 40 cattle included in the examination, 9 (22.5 per cent) were found to be throwing off virulent tubercle bacilli in the feces or rectal scrapings. Of these 9 cattle, the tubercle bacilli were found virulent for guinea pigs, and in 8 of the 9 the tubercle bacilli were virulent for rabbits.

"The successful demonstration of tubercle bacilli in the feces or rectal scrapings of cattle is either proof that extensive or 'open' lesions of tuberculosis exist, or an indication that tubercle bacilli ingested are passing through the length of the alimentary canal of the animal under examination. Cattle with 'open' lesions of tuberculosis and throwing off tubercle bacilli in the feces or rectal scrapings as a rule show physical symptoms of the disease. The demonstration of tubercle bacilli in the feces or rectal scrapings of cattle apparently free of tuberculosis, but stabled with highly infected cattle, may be accepted as an indication that tubercle bacilli are passing through such cattle—the tubercle bacilli being ingested and thrown off in numbers large enough to be demonstrable in the feces or rectal scrapings.

"Cattle showing physical symptoms of tuberculosis are the most active disseminators of the disease, because of the probable existence of 'open' lesions, and the likelihood that tubercle bacilli are thrown off in the excreta. Since they show physical symptoms they may be detected in a herd by a consideration of the history, careful observation and a thorough examination of each animal. Tuberculin-reacting cattle do not necessarily throw off tubercle bacilli in the feces until the development of 'open' lesions of tuberculosis, in which event the condition may be detected by a consideration of the history, careful observation, and a complete physical examination."

See also previous notes (E. S. R., 18, p. 378; 19, pp. 181, 986).

Report on the findings of the Illinois Tuberculin Commission (*Amer. Food Jour., 6 (1911), No. 1, pp. 28, 29*).—This is a report of the commission appointed for the purpose of inquiring into the reliability and efficiency of the tuberculin testing of dairy cows, and the necessity for its adoption. The commission did not recommend the adoption of the test for controlling tuberculosis, but recommended the physical examination of dairy cows and a certificate as to the health of animals shipped into the State of Illinois for breeding purposes.

The strength of various tuberculins measured according to the official German method, K. SIEGESMOND (*Ztschr. Hyg. u. Infektionskrank., 66 (1910), No. 3, pp. 357–382*).—After reviewing the methods for preparing and measuring the strength of the various tuberculins, the author reports the results of his tests with the method in use at the Royal Institute for Experimental Therapeutics at Frankfort-on-the-Main.[a]

It was found that Béraneck's tuberculin (E. S. R., 23, p. 687) is the weakest preparation and tuberculol C[b] the strongest. The latter was decidedly stronger than the standard preparation. Berner's tuberculin[c] was found to be only one-half as strong as the official preparation, while the Dohna tuberculin in one instance was just as strong as the official.[d] The other samples of this preparation were uniform in their action.

The life cycle of Theileria parva: The cause of East Coast fever in cattle in South Africa, R. GONDER (*Jour. Compar. Path. and Ther., 23 (1910), No. 4, pp. 328–335, fig. 1*).—The author presents an illustrated account of the life history of *T. parva* as worked out at the Government Veterinary Bacteriological Laboratory at Onderstepoort, Pretoria.

The development of the parasite in the organs is divided into 2 generations distinguishable by their morphology (agamogenetic and gamogenetic). The tick of chief importance in the transmission of the disease, *Rhipicephalus appendiculatus*, was largely used in the investigations. "If the tick has been infected as a larva it can only transmit the disease in the nymphal stage; if it has become infected as a nymph it can only transmit the disease as an imago. An infected tick purifies itself completely from all infection once it has bitten an animal. If infected as a larva it can only become reinfected as a nymph, but never as an adult tick."

[Cultivation of the acid-fast bacillus found in the intestine of cows in Johne's disease], F. W. TWORT (*Proc. Roy. Soc. [London], Ser. B., 83 (1910), No. B 562, p. 158*).—The author states that he has succeeded in isolating and growing the acid-fast bacillus found in the intestine of cows in Johne's disease.

"The first generation of this bacillus grows often long, with occasional branching and club formation, in subcultures it gradually grows smaller, and in the second or third generation is about the size of the tubercle bacillus. The growth is only just visible to the naked eye, and subcultures on the ordinary laboratory media show no evidence of multiplication. Johne's bacillus grows somewhat more easily than Hansen's lepra bacillus; the bacilli being well formed and quite acid-fast. The cultures were incubated at 40° C."

Bell's paralysis in a heifer calf, T. G. PALGROVE (*Vet. Jour., 67 (1911), No. 427, pp. 52–54*).—A description of a case in a 6-months-old calf with ultimate recovery.

A new disease of sheep, A. GAERTNER (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 30, pp. 595–597; Centbl. Bakt. [etc.], 1. Abt., Orig., 54 (1910), No. 6, pp. 546–563; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 48 (1910), No. 3, p. 78; Vet.*

[a] Klin. Jahrb., 7 (1898–1900), p. 225.

[b] Hyg. Rundschau, 8 (1898), No. 10, p. 481; 10 (1900), No. 8, p. 361; Beitr. Klinik Tuberkulose, 10 (1908), No. 4, pp. 293–372.

[c] Arch. Wiss. u. Prakt. Tierheilk., 32 (1906), No. 6, p. 562.

[d] Klin. Jahrb., 7 (1898–1900), p. 359.

Rec., 23 (1911), No. 1183, p. 579).—A new ovine disease is described, and experiments reported.

The disease usually first manifests itself in the newly lambed ewes, then in the newly born lambs, and finally spreads to other lambs and sheep. The etiological factor is supposed to be a diplococcus simulating an atypical form of the *Diplococcus pneumoniæ*, and which was isolated from the blood and organs of sheep dead from the disease. The organism was capable of reproducing the disease by introduction into the respiratory tract, the alimentary tract, and the peritoneum. The name proposed by the author is *Streptococcus (Diplococcus) lanceolatus ovium.*

Symptomatically considered, the ewes became sick and showed a fever corresponding to a temperature from 103.8 to 105.4° F., a loss of appetite, general prostration, and a distended, tender abdomen. "The mucous membranes of the vagina and vulva were swollen and reddened, and a foul-smelling fluid was discharged from the genital passages with the accompaniment of painful straining." Another form manifests itself by a profuse, purulent, nasal discharge, which is accompanied by a swelling and tenderness in the nares and associated with fever and prostration. Three different forms could be noted on post-mortem examination.

Report of the veterinary department, R. A. CRAIG (*Indiana Sta. Rpt. 1910, p. 61*).—During the year ended June 30, 1910, more than 400,000 cc. of hog-cholera serum was produced. The total number of hogs treated was about 10,000. Reports of 2,116 hogs treated in 42 herds show 70, or 3.3 per cent, to have died. The average cost to stockmen of the average dose of serum used (40 cc.) was 60 cts. per hog.

"For the purpose of increasing the quantity of virulent material that may be secured from a virulent blood hog, from 1,500 to 3,000 cc. of a normal salt solution was injected into the abdominal cavities of a number of the hogs used in this work. The injections were made 2 hours before the cholera hogs were bled, and as soon as the animals had died the virulent normal salt solution was removed. Eleven hyperimmunes were produced with the virulent normal salt solution, and all of them produced potent serum."

Epizootic of mastitis in pigs, A. V. TÖTH (*Berlin Tierärztl. Wchnschr., 27 (1911), No. 4, pp. 58, 59*).—It has been observed that in many instances the mammary gland of the female hog becomes infected and destroyed, and eventually drops off. The author seeks to show the relation which variola and pasturing have to the disease. He found a few bacteria in the nodules which were present in the gland, and will report upon their identity later.

The surgical anatomy of the horse, J. T. SHARE-JONES (*London, 1906, pt. 1, pp. XII+159, pls. 33; 1907, pt. 2, pp. X+190, pls. 34; 1908, pt. 3, pp. X+220, pls. 28*).—Part 1 of this work is devoted to the head and neck, part 2 to the fore limbs, and part 3 to the hind limbs.

A protective reaction of the host in intestinal coccidiosis of the rabbit, T. SMITH (*Jour. Med. Research, 23 (1910), No. 3, pp. 407–415, pls. 4*).—The author here reports studies made of *Eimeria stiedæ* (*Coccidium cuniculi*) in a rabbit, which indicate the manner in which immunity establishes itself.

The morphology and life history of Eimeria (Coccidium) avium, a sporozoön causing a fatal disease among young grouse, H. B. FANTHAM (*Proc. Zool. Soc. London, 1910, III, pp. 672–691, pls. 4, dgm. 1*).—The complete life cycle of *E. avium*, responsible for the dwindling of grouse broods in the spring, is here set forth for the first time. It is shown that, owing to the rule of priority, the generic name Coccidium (Leuckart, 1879) no longer holds, being replaced by that of Eimeria (A. Schneider, 1875). Since the coccidia of birds were first recorded in fowls by Silvestrini and Rivolta in 1873 under the name *Psorospermium avium* and the name *Coccidium tenellum* was not erected by Railliet and Lucet until 1891, the specific name *avium* holds through the law of priority. By administering feces containing oöcysts from diseased grouse to young fowl chicks and pigeons, the author was able to reproduce the disease exactly as it occurs in grouse.

"*E. avium* appears to be purely a parasite of the gut of the grouse and does not affect such gut diverticula as the liver. The crop and gizzard of infected birds are rarely parasitized, though they may contain oöcysts in the condition in which they have been ingested with food. Examination of the duodenum shows that the sporocysts ingested with the food are attacked by the pancreatic juice (as I have proved by pancreatic digestion experiments, using both natural pancreatic juice and trypsin), and the sporozoites are set free. These invade the tissue of the duodenum, rapidly become schizonts and multiply, the result being that the duodenum is often riddled by the parasites, and consequently inflamed. Both the villi and the crypts of Lieberkühn are attacked, and the parasites have also been found, though much more rarely, in the submucosa. Great hypertrophy followed by atrophy of the epithelial host cell occurs, and the tissue attacked is often reduced to a finely granular, structureless mass. Desquamation of the gut is common, and epithelium containing various developmental stages of the parasite can be found floating free in the gut contents.

"Some of the merozoites formed in the duodenum pass down the gut, reach the ceca and recommence their life cycle there. Active schizogony and sporogony go on in the ceca, chiefly in the epithelium, very rarely in the submucosa. Often the ceca are as heavily parasitized as the duodenum, whole areas being completely denuded of the epithelium, especially when the fertilized oöcysts pass outwards into the cecal contents. The walls of the ceca are often rendered very thin and tender by the action, direct and indirect, of the parasite. Ripe oöcysts and sporocysts occur in the lumen of the ceca of dying chicks."

A list of 20 references to the literature is appended.

Observations on the parasitic Protozoa of the red grouse (Lagopus scoticus), with a note on the grouse fly, H. B. Fantham (*Proc. Zool. Soc. London, 1910, III, pp. 692–708, pls. 3*).—The author has found and here considers 7 species of Protozoa, exclusive of coccidia, that are parasitic in grouse, namely, *Leucocytozoön lovati*, *Hæmoproteus mansoni*, *Spirochæta lagopodis* n. sp., *S. lovati* n. sp., *Trichomonas eberthi*, *Amœba* (*Entamœba*) *lagopodis* n. sp., and *Monocystis* sp. He found that the grouse fly (*Ornithomyia lagopodis*) sucks the blood of the grouse, as blood in all stages of digestion was obtained from the fly's gut. Examination of the salivary glands of the fly showed that an anticoagulin is secreted by them. A fungus was found to infest the Malpighian tubes of the fly.

A list of 34 references to literature is appended.

Experimental studies of avian coccidiosis, especially in relation to young grouse, fowls, and pigeons, H. B. Fantham (*Proc. Zool. Soc. London, 1910, III, pp. 708–722, pl. 1, fig. 1*).—In order to test the specificness of the coccidian parasite of the grouse, experiments were made with the result that the coccidium pathogenic in young grouse and responsible for the dwindling of the broods, particularly in the spring and early summer, was found to be equally injurious to healthy young fowls and young pigeons. Healthy grouse chicks also were experimentally treated by administering food mixed with small quantities of infected feces from other grouse suffering from coccidiosis, and fatal results ensued.

"Some authors have given the name *Coccidium cuniculi* to the parasite of birds, thereby identifying the coccidium of birds with that of rabbits. Having had the opportunity of obtaining fresh material from rabbits dying rapidly of acute coccidiosis, I fed a healthy young pigeon directly with oöcysts of *C. cuniculi*. At first oöcysts were voided by the pigeon, then none were found in the feces, and no symptoms associated with coccidiosis appeared at any time. The first oöcysts voided were merely those supplied to the bird which had passed unchanged through its alimentary tract. Though this pigeon received several doses of the oöcysts of *Eimeria* (*Coccidium*) *cuniculi*, it never developed coccidiosis, and the post-mortem examination made immediately after killing the bird showed a perfectly normal condition of every organ. I consider that these experiments show conclusively that *E. avium* and *E. cuniculi* are distinct species of Eimeria and are not identical. There are also morphological differences between the two, chiefly of size (*E. avium* is the smaller)."

The author discusses experimental methods, the symptoms of coccidiosis, internal organs, relative resistance of different breeds of fowls and pigeons to coccidiosis, the dissemination of coccidiosis over tracts of country, the duration of vitality of coccidian oöcysts, and the effects of certain reagents on coccidian oöcysts.

Observations on the blood of grouse, H. B. FANTHAM (*Proc. Zool. Soc. London, 1910, III, pp. 722–731, pl. 1*).—In blood-counts of 50 birds the number of erythrocytes was found to vary from 3,600,000 to 5,800,000, averaging 4,300,000 per cubic millimeter. The number of red cells was apparently higher in the cock grouse (4,400,000 per cubic millimeter) than in the hen grouse (3,800,000 per cubic millimeter). The number of leucocytes found per cubic millimeter in the blood of apparently healthy grouse varied from 22,000 to 50,000, averaging about 32,000 per cubic millimeter.

Classification of the leucocytes of healthy and diseased grouse.

Class.	Apparently healthy grouse.	*Leucocytozoön lovati* in blood of a grouse.	Two grouse chicks dying from coccidiosis.	A fowl chick dying from coccidiosis.	Three adult grouse killed by *Trichostrongylus pergracilis.*
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Lymphocytes	57	63.0	26.0–50.0	20.5	44.0–62.5
Large mononuclears	19	28.0	13.0–31.0	29.5	6.0–10.0
Polymorphonuclears	20	5.5	31.5–39.5	47.0	7.5–14.0
Eosinophiles	3	2.5	3.5– 5.5	2.0	23.5–42.0
Mast cells	1	1.0	0.6	1.0	0.5

"The number of red cells found in an adult cock grouse dying from helminthiasis was 3,250,000 per cubic millimeter, the number of red cells for a normal cock grouse being about 1,000,000 more. The hemoglobin value estimated by Tallquist's scale was 60 for a grouse suffering from helminthiasis and 80 to 90 for healthy adult grouse."

A list of 13 references to literature is appended.

Antifowl cholera serum and its practical significance, P. W. SISOFF (*Arch. Vet. Nauk* [*St. Petersb.*], *40* (*1910*), *No. 7, pp. 804–818; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3* (*1910*), *No. 7, p. 822*).—This is an extensive report in regard to the preparation of a polyvalent, antifowl-cholera serum and the practical, therapeutical results obtained with it.

It is shown that by immunizing a bovine over an extended period (over 2 years) with virulent, fowl-cholera cultures, an active prophylactic and curative serum can be obtained. Using this serum prophylactically in a great many epizootics (3,876 birds) it was noted that the disease can be easily held in check. As a curative agent the figures show that there was a reduction in the mortality from 90 to 22 per cent where the serum was used.

RURAL ECONOMICS.

The future of agriculture, O. E. BAKER (*Ann. Rpt. Wis. Agr. Expt. Assoc., 8 (1910), pp. 20–25*).—This article calls attention to the high prices of food products that have prevailed during the past five years and assigns its cause to the operation of the economic law of supply and demand.

It is shown that there has been a steady decrease in rural population and growth of city population, decreasing yields of crops as a result of bad farming systems, and a marked decrease in exports of staple farm products. These tendencies, it is believed, will continue to raise the price of food supplies in the future and farming for young men is urged for the following reasons: (1) Land values will steadily increase; (2) the high price of farm products is certainly to be maintained and probably increased; (3) land is a safe investment; (4) farmers can by organization possess great political power; and (5) farming is a healthful occupation.

The needs of modern agriculture as conceived by the author are enumerated as (1) instruction for farmers, not alone in improved methods of crop production and soil management, but even more in guidance and aid in the formation of cooperative organizations for buying and selling to put them on a level with the organized interests with which they do business; (2) schools which fit for country rather than for city life; (3) better means of communication, such as good roads, telephones, a parcel post, etc.; and (4) above all a more sanitary, wholesome, and social life.

The causes of the increased cost of agricultural staples and the influence of this upon the recent evolution of other objects of expenditure, E. D. JONES (*Rpt. Mich. Acad. Sci., 12 (1910), pp. 137–142*).—The causes of the increased cost of food supplies and staple agricultural products which enter into manufactured goods and have a bearing on the present high cost of living are believed to be chiefly the social distributive forces which new personal and household wants seem to require and the great economic wastes of natural resources.

"It may be an error to say that we have come into a period of years which will prove a turning point in our national civilization, but it is difficult to imagine any economic reaction more fundamental than that between a nation and the land upon which it lives. If we are really through with the easy expansion of our agriculture, as the population increases we shall need to review our entire national economy and eliminate wastes rather than give up precious utilities."

The fight for conservation, G. PINCHOT (*New York, 1910, pp. IX+152*).—This book contains a plea for the development and preservation of the natural resources in the United States, such as the public lands, forests, water courses, mineral deposits, and coal, for the common welfare now and in the future.

Gigantic plan for meeting the high cost of living.—A project for numerous model farms (*Tradesman, 64 (1910), No. 22, pp. 29, 30*).—A discussion of the purpose and possibilities of the National Farm Homes Association previously described (E. S. R., 23, p. 291).

A demonstration of intensive culture, J. R. DUNSTAN (*Jour. Southeast. Agr. Col. Wye, 1909, No. 18, pp. 16–19*).—An account of the method of cultivating 6 acres of land in potatoes and cauliflower and of the returns therefrom.

The cost of raising the potatoes and cauliflower was £16 5s. and £10 18s. 9d., respectively, and the total net return £48 19s. 7d. per acre. Both crops were grown the same year. The estimated labor represents one-fourth of a man's working time for 12 months, and the returns are presented with a view of showing what can be done on small holdings with the application of capital and intelligent industry.

Farm management, R. H. POSTON (*Ann. Rpt. Wis. Agr. Expt. Assoc., 8 (1910), pp. 30–34, pl. 1*).—This article makes suggestions for the profitable employment of live stock and laborers, the proper location of buildings, the time and method of planting crops, and the preservation of manure as important factors in farm management. It is concluded that "if all men would use the same business methods about their farm management that they would running any other business, farming would be more pleasant and more profitable."

The business side of farming, B. H. CROCHERON (*Gard. Mag. [N. Y.], 12 (1910), No. 6, pp. 268–270*).—Suggestions made in this article for the more profitable operation of farms include discussions of the advantages of small farms, the raising of difficult products, finishing products on the farm, securing the advantages of near-by and special markets, keeping daily expense accounts, and summing up in a yearly inventory.

Methods of farm advertising, J. C. MARQUIS (*Ann. Rpt. Wis. Agr Expt. Assoc., 8 (1910), pp. 14–20, fig. 1*).—The value of advertising as an essential factor in successful farm management is discussed and illustrated.

The agricultural industry a unit, E. STREIT (*Illus. Landw. Ztg., 30 (1910), No. 88, p. 826*).—This article treats the different lines of work conducted on a farm as parts of a system in which the different branches are to be considered in relation to the whole organism, the one aim being to secure the highest profits for the labor and capital expended. On a diversified farm, therefore, it is practically useless to attempt to ascertain the cost of production of any particular crop, but the keeping of accounts for the farm as a whole is both practical and necessary for the up-to-date farmer for his practical guidance in farm management. The latter is regarded as the most essential feature in profitable agriculture at the present time.

Investigations on the profitableness of agriculture in Switzerland during 1908–9, E. LAUR (*Ann. Agr. Suisse, 11 (1910), No. 2, pp. 12–141*).—In addition to data on the yields, value, exports, etc., of farm products raised for the year ended February 28, 1909, this report contains a detailed account of the profitableness of agriculture as determined from 287 farms of various sizes. The following table gives the receipts classified according to the kind of holding:

Kind, number, and receipts of farm holdings in Switzerland.

Kind of holding.	1901–1908.		1908.		
	Number of holdings.	Receipts per holding.	Number of holdings.	Receipts.	
				Per holding.	Per hectare of surface cultivated.
		Francs.		*Francs.*	*Francs.*
Small holdings	157	2,601	29	2,259	565
Small peasant holdings	553	4,379	115	4,660	630
Peasant holdings	351	6,378	62	6,927	555
Large peasant holdings	317	10,074	63	11,027	522
Large holdings	78	17,072	18	21,546	520

The average receipts, as determined from 1,457 holdings averaging 13.64 hectares in size for the years 1901–1908, inclusive, were 6,820 francs, or an average return of 500 francs per hectare (about $39 per acre).

The agrarian industries: Their development and present condition with special reference to the outlook for the commonwealth of Australia, H. W.

Potts (*Rpt. Austral. Assoc. Adv. Sci., 12 (1909), pp. 569–581*).—This article gives a history of agricultural development in Australia, and discusses its capabilitites for the extension and improvement of both pastoral and agricultural industries as a result of the application of scientific principles to agriculture.

A review of Australian conditions with reference to land areas, climate, adaptability to live stock and crop raising, population, home and foreign markets, and government interest in fostering agricultural education and rendering financial aid, leads the author to conclude that "the outlook for agriculture in Australia affords ample evidence for abiding confidence and lasting prosperity."

Agricultural conditions in Lower Lombardy with special reference to the farm laborer, F. Rovelli (*Die Agrarverfassung der Niederlombardi mit besonderer Berücksichtigung der Landarbeiter. Karlsruhe, 1908, pp. X+228, map 1*).—Part 1 of this volume describes the agricultural conditions of Lower Lombardy, including accounts of the more important lines of work such as rice culture and dairying, methods of irrigation, the extent, nature, and capital invested, and conditions of land ownership.

Part 2, which composes the bulk of the volume (pp. 49–228), is devoted entirely to a discussion of the agricultural classes, including landowners, tenant farmers, and farm laborers. The latter are described in detail as to wages, hours of labor, standard of living, and organizations, with a chapter on cooperative farms. The social and political aspects of the agricultural labor problem are also presented. A bibliography is included.

[Improving the conditions of the rural population], D. G. Acevedo (*Rev. Asoc. Rural Uruguay, 39 (1910), No. 9–10, pp. 773–815*).—This is a report by the chairman of a commission appointed to investigate the conditions surrounding the poorer classes of the rural population in Uruguay, with a view to making suggestions for their physical, educational, and economic improvement.

The information was secured by means of personal inquiry and in reply to a series of questions sent to representative parties in different sections of the country. The answers relate to the number and average size of poor families, the forms of employment in which engaged, the causes contributing to conditions of poverty, the ability and aptitude of the people for labor, what industries established in the different districts offer the best prospects of meeting existing conditions, and what practical means should be employed to fit the poorer classes for regular employment. The information here presented affords an insight into rural conditions in Uruguay.

A practical handbook upon agricultural tenancies, C. E. Curtis and R. A. Gordon (*London, 1910, pp. XII+328*).—This volume contains a clear and concise statement of facts regarding agricultural leases and tenancies in Great Britain compiled from the legal point of view. The authors maintain that recent legislation has so revolutionized agricultural practice and so strengthened the position of tenant farmers that the time has arrived to set forth the relations of landlord and tenant as to their respective obligations and duties, which this volume aims to make plain.

The book also contains the texts of the English and Scottish agricultural holding acts of 1908 and the small holdings and allotments acts of 1908.

Notes on large and small proprietary holdings in Spain, A. Barthe y Barthe (*Bul. Inst. Internat. Statis. [The Hague], 18 (1910), No. 2, pp. 507–512*).—This article gives a history of land tenure in Spain, with statistical data on the number and size of holdings in certain provinces.

"Concentration of the land in the hands of a few proprietors is particularly noticeable in the west and middle of the peninsula. In the northern and eastern parts the holdings in general are quite small." Large single holdings run as high as 350,000 acres, while small holdings are made up in many instances of many widely separated parcels of land. This latter feature of the Spanish land tenure system is regarded as seriously detrimental to the economic welfare of the peasant class.

Long-term credit in favor of rural small proprietors, A. BECKERICH (*Jour. Agr. Prat., n. ser., 20 (1910), No. 45, pp. 595–599*).—This is a discussion from the economic and legal points of view of the main provisions of the law of March 19, 1910, which provides credit for long periods on reasonable terms to small-farm holders in France (E. S. R., 23, p. 292). The conclusion is reached that this law is a valuable supplement to existing homestead laws and will have a tendency to improve the economic condition of small holders and to encourage their remaining on the land.

Agricultural bank, J. M. DICKINSON (*War Dept. [U. S.], Spec. Rpt. Philippines, 1910, pp. 24, 25*).—An account of the business conducted by the Philippine agricultural bank since opening October 1, 1908, to June 30, 1910.

Of 565 applications for loans during this period, 453 were refused, principally on account of defective titles. The total amount loaned was $142,225. The law limits the amount that can be loaned on property to 40 per cent of its value. It is believed that "unless the bank shall establish more agencies at central points where loans can be negotiated with the minimum of expense to borrowers, the utility of the bank will fail or will be confined to a comparatively small area."

[Farmers' banks in North Dakota], C. FRITZ and W. LYNCH (*Cooperation [Minneapolis], 2 (1910), No. 8, pp. 32–34*).—Accounts are given of the establishment, development, and success of farmers' cooperative banks at Chaffee and Lidgerwood, N. Dak. The banks are said to be in a very prosperous condition.

The development of agriculture by organized effort, E. DAVENPORT (*Agr. of Mass., 57 (1909), pp. 27–41*).—This paper and discussion set forth the advantages of cooperation in the selling of fruit, live stock, dairy products, etc., with particular emphasis on the idea that the community rather than the individual should specialize in production.

It is shown that community specialization and association render the marketing and selling of agricultural products much easier and result in three advantages, namely: (1) They increase the net returns for any given year, making quite profitable a business which on an individual basis is liable to bring only loss and disappointment; (2) such a community organization, with established reputation and settled business methods, constitutes a kind of permanent asset to every member; and (3) they insure to every new man seeking to engage in that form of production a reputation, a market for his products, and an assured profit from the first—all of which is an additional asset to the community and a substantial addition to land values.

Cooperation among farmers—the business side, E. M. TOUSLEY (*Ann. Rpt. N. J. Bd. Agr., 37 (1909), pp. 122–138*).—This article treats of the advantages of farmers' cooperative stores for both buying and selling, and of the causes most likely to lead to the failure of such stores.

Third Transvaal Cooperative Congress, H. K. J. VAN NOORDEN ET AL. (*Transvaal Dept. Agr. Farmers' Bul. 119, pp. 67*).—A report of the proceedings of the congress held at Pretoria April 12–14, 1910.

The first aid to shipping fruits, vegetables, butter, eggs, and game for profit to market, T. G. THOMAS (*Houston, Tex., 1910, pp. 98*).—This book furnishes information for producers on methods of gathering, preparing, packing, and shipping fruits and vegetables, and on preparing and shipping dairy and poultry products and game for successful and profitable marketing.

Farm labor in Virginia, A. JEFFERS (*South. Planter, 71 (1910), No. 12, pp. 1231, 1232*).—This article sets forth the conditions which produce a scarcity of farm labor in Virginia.

The crowding of the rural population, both white and colored, into the towns and cities, which has been going on with the industrial development of Virginia during the past 45 years, is regarded as leading to a scarcity of farm help while increasing the amount of vagrancy. Suggestions are made for the readjustment of the population, particular emphasis being laid on the need for more stringent enforcement of the vagrancy law and its adoption and enforcement by town and city authorities. This plan, it is believed, would have a tendency to force the unemployed in cities back to the land.

[General observations on the employment of casual labor in agricultural districts], R. FARRAR (*London: Govt., 1909, pp. 22*).—This pamphlet gives a description of the conditions under which persons are temporarily employed in the picking of peas and fruits in England, including wages, hours of labor, standard of living, sleeping accommodations, and other economic and social features. The evils of the system are said to be demoralizing to workers and a grave nuisance in the districts where such services are rendered.

An appendix gives in contrast the police regulations in force during the hop-picking season in three districts of Bavaria for the control of the immigrant labor force.

The International Institute of Agriculture.—Its labors in behalf of economic bettterment, L. EINAUDI (*Rome, 1910, pp. 11*).—This is an account of the economic service the institute is expected to perform in determining the world supply of crops, and of its labors accomplished in this direction by the returns on wheat production in 1910 for 20 of the principal wheat-producing countries.

Publications of the Bureau of Statistics (*U. S. Dept. Agr., Div. Pubs. Circ. 12, pp. 5*).—A list of the publications of this Bureau available for distribution.

AGRICULTURAL EDUCATION.

The American system of agricultural education, A. C. TRUE and D. J. CROSBY (*U. S. Dept. Agr., Office Expt. Stas. Circ. 106, pp. 28, pls. 8*).—This is a revision of Circular 83, of this Office, previously noted (E. S. R., 21, p. 397), describing graduate, collegiate, secondary, and elementary educational institutions giving instruction in agriculture.

African agriculture.—IV, Agricultural education, M. N. WORK (*South. Workman, 40 (1911), No. 2, pp. 79–87, figs. 7*).—This article describes three ways in which instruction in agriculture is being disseminated in Africa, viz, by schools, fairs, and agricultural demonstration work. Brief notes are given on two recently established agricultural schools in Gambia and Sierre Leone, and on agricultural shows held in the Gold Coast in 1909 and in Calabar in 1910.

Studies of irrigation plants and educational institutions for agricultural engineering in Prussia, C. B. CARLSSON (*Meddel. K. Landtbr. Styr. [Sweden], 1910, No. 4 (151), pp. 50+VIII*).—A report of studies made and impressions received during more or less extended visits to these institutions.

Where forestry can be studied (*Amer. Forestry, 16 (1910), No. 12, pp. 730–733*).—Information is given concerning the graduate courses in forestry at Yale, Michigan, Harvard, Minnesota, and Washington universities, the undergraduate college courses at 12 land-grant institutions, 3 other colleges, and 1 special forest school, and forestry as a subordinate subject in numerous other college and school courses.

The forest school—a growing institution (*Canad. Forestry Jour., 6 (1910), No. 3, pp. 75–77, figs. 3*).—Notes on the instruction in forestry at educational institutions in Canada and the United States.

Course of study for departments of agriculture and home economics in Louisiana high schools, V. L. Roy (*Baton Rouge: State Supt. Ed., 1910, pp. 62*).—The supervisor of agricultural high schools in Louisiana here outlines the minimum requirements adopted by the state board of education for high schools receiving state aid for departments of agriculture. These requirements include land inclosed by fence, a barn, apparatus for teaching the sciences including agriculture, \$180 worth of tools and farm implements, an appropriation for the maintenance of the department of at least \$250 annually, and a teacher of agriculture who must be a graduate of an agricultural college with some practical experience in farming, can not be the principal of the school, must be employed for 12 months in the year, and can not be required to teach any class outside of the department of agriculture with the exception of botany and zoology if these subjects are given an agricultural turn. The special state appropriations to approved departments of agriculture will range from \$1,200 to \$1,500 for each school.

Courses of study are suggested for high schools having only departments of agriculture and home economics and for high schools which also offer literary or commercial courses. Following these are syllabi of courses in general agriculture, farm animals, farm bookkeeping, chemistry, dairying, mechanical drawing, agricultural engineering, entomology, farm crops, field practice, horticulture, rural law, farm management, poultry, shop practice, soils and fertilizers, sewing, cooking, food study, physiology, home nursing, dietetics, and household management, with suggestions for classroom recitations, laboratory practicums, and field, shop, and home work. Directions for teachers are given in considerable detail and these are followed by price lists of apparatus for the various laboratories, lists of shop and garden tools and field implements and of miscellaneous equipment, and a suggestive list of publications for the library. Specifications are given for barns to be erected on the high-school farms.

Annual for Edgar County public schools, 1910–11, G. W. Brown (*Ann. Edgar Co. [Ill.] Pub. Schools, 1910–11, pp. 123, pl. 1, figs. 40, dgms. 2*).—In addition to the usual public school reports data are included concerning the farm boys' encampment, the farmers' and teachers' excursion, an outline of the minimum of instruction in agriculture for the year, a list of county fair premiums for school exhibits, directions for making the Babcock milk test, and other data intended to aid the teacher in conducting an up-to-date school relating its work to the rural community life.

Annual report of Winnebago County schools, 1910, O. J. Kern (*Ann. Rpt. Winnebago Co. [Ill.] Schools, 1910, pp. 96, figs. 105, dgms. 8*).—This report contains, in addition to the usual information concerning the schools of the county, chapters on outdoor improvement including education for country life, indoor improvement with reference to health conditions, schoolroom decoration, school libraries, etc., play and playgrounds, agricultural education, the new country home, and consolidation of country schools. This last chapter contains several building plans, two landscape plans, and one planting list.

A state fair school of domestic science, Mrs. H. M. Jones (*Minn. Hort., 38 (1910), No. 7, pp. 241–248, pl. 1, figs. 2*).—The state fair school of domestic science, at Springfield, Ill., for which the state legislature provided a \$20,000 building, is described. Details are given concerning the daily routine of the women and girls who receive instruction in this school.

The training of teachers for the rural schools, A. E. BENNETT (*Des Moines, [1910], pp. 13*).—Data are given concerning teacher-training for rural schools in England, Canada, New South Wales, and the United States. In the case of this country the author deals with (1) model rural schools and rural-school extension, (2) normal training in high schools, (3) county teachers' training schools (4) junior normal and summer schools, and (5) miscellaneous aids. He then discusses Iowa's needs, and adds a bibliography with about forty references.

Suggestions for rural schools, LEILA RUSSELL (*Winthrop Norm. and Indus. Col. S. C. Bul., 4 (1910), No. 2, pp. 14*).—These suggestions relate to seat work with nature-study material intended to give concreteness to the instruction, oral work in English and geography, with special reference to cotton and corn, and a rural school exhibition. References to helpful literature are given.

Exercises in elementary agriculture, G. A. BRICKER (*Agr. Col. Ext. Bul. [Ohio State Univ.], 6 (1910), No. 2, Sup. 1, pp. 8, figs. 5*).—This is a continuation of this series (E. S. R., 24, p. 92).

Selecting, scoring, and storing seed corn and potatoes, A. E. NELSON and V. KEYSER (*Nebr. Dept. Pub. Instr., 2. ser., 1910, Bul. 20, pp. 3–28, figs. 14*).—Detailed instructions are given the members of the Nebraska boys' club for selecting, scoring, and storing seed corn and potatoes, including forms for records and score cards.

Tree growing in the public schools, E. B. BABCOCK and H. A. GREENE (*California Sta. Circ. 59, pp. 19, figs. 6*).—A planting list of the best evergreen and deciduous trees for California conditions is followed by directions for germinating and planting both large and small seeds, transplanting the seedlings, and setting out the trees in permanent locations. Mention is also made of trees that can be grown from cuttings. Suggestions are given for the care and protection of young trees, for the organization of boys' and girls' clubs, and for tree-seed exchange.

Lists of leaflets, circulars, bulletins, books, and other literature on trees are appended.

How to know some Ohio trees, W. R. LAZENBY (*Agr. Col. Ext. Bul. [Ohio State Univ.], 6 (1910), No. 3, pp. 16, figs. 15*).—Different ways of recognizing trees by some of their more prominent characteristics are given. The work is evidently intended for school children, and no attempt is made to introduce botanical distinctions.

The development of home economics, ISABEL BEVIER (*Good Housekeeping Mag., 51 (1910), No. 4, pp. 465–469, figs. 5*).—A historical account of the development of the subject of home economics in the United States and the agencies which have contributed to it.

Cookery text-books, CLARA N. GRAVES (*Greenville, S. C., 1910, pp. 56*).—This collection of recipes was prepared particularly for use in teaching domestic-science classes of public schools in mill villages and rural communities.

MISCELLANEOUS.

Twenty-third Annual Report of Indiana Station, 1910 (*Indiana Sta. Rpt. 1910, pp. 70*).—This contains the organization list, reports of the director and heads of departments, of which that of the veterinarian is abstracted on page 684 of this issue, and a financial statement for the federal and miscellaneous funds for the fiscal year ended June 30, 1910, and for the state funds for the fiscal year ended September 30, 1910.

Publications, Office of the Secretary, Office of the Solicitor, and the Division of Publications (*U. S. Dept. Agr., Div. Pubs. Circ. 9, pp. 4*).—This gives a list of these publications available for distribution.

Publications of the Office of Public Roads (*U. S. Dept. Agr., Div. Pubs. Circ. 10, pp. 3*).—A list of the publications available for distribution.

Publications of the Bureau of Plant Industry (*U. S. Dept. Agr., Div. Pubs. Circ. 13, pp. 16*).—A list of the publications available for distribution.

Publications of the Bureau of Animal Industry (*U. S. Dept. Agr., Div. Pubs. Circ. 15, pp. 8*).—A list of the publications available for distribution.

Monthly Bulletins of the Department Library, December, 1910, and January, 1911 (*U. S. Dept. Agr., Library Mo. Buls., 1 (1910), No. 12, pp. 319–339; 2 (1911), No. 1, pp. 3–30*).—These numbers contain data for December, 1910, and January, 1911, respectively, as to the accessions to the Library of this Department and the additions to the list of periodicals currently received. The January number also contains a complete list of the works on pigeons at present in the Library.

The card index of experiment station literature (*U. S. Dept. Agr., Office Expt. Stas. Circ. 107, pp. 2*).—This circular outlines briefly the general plan of the subject index of experiment station literature regularly issued in card form by this Office, and states the conditions governing the distribution and sale of the index.

Experiment Station Work, LXI (*U. S. Dept. Agr., Farmers' Bul. 430, pp. 24, figs. 14*).—This number contains articles on the following subjects: Unusual *v.* standard fertilizers, symptoms of disease in plants, the premature dropping of figs in the South, condimental feeds, feeding the dairy calf, defects in cottage cheese, and the Iowa silo.

[Danish agriculture and its various branches during the year 1909] (*Tidsskr. Landökonomi, 1910, Nos. 1, pp. 1–37; 4, pp. 241–257; 8, pp. 489–519; 9, pp. 553–580; 12, pp. 716–738; 13, pp. 753–784*).—The usual review of the condition of Danish agriculture during the year is given as follows: Agriculture, by Hertel; Dairying, by B. Böggild; Animal Husbandry, by A. Appel; Agricultural Crops, by K. Hansen; Horse Raising, by J. Jensen; Agricultural Exports and Imports, by N. C. Christensen; Denmark's Butter Exports, 1909–10, by B. Böggild; and Meteorological Conditions During the Year ended September 30, 1910, by Hansen.

Agricultural year book, M. HOFFMAN (*Jahresber. Landw., 24 (1909), pp. XXXIV+478, pl. 1, figs. 27*).—This is a volume of abstracts of articles on plant and animal production, agricultural machinery, and rural economics.

Index to Agricultural Gazette of New South Wales, Vols. I to XX, 1890–1909 (*Sydney, 1910, pp. 117*).—A subject and author index of these volumes.

The Journal of the Board of Agriculture, General Index Vols. I–X, 1894–1904, and Vols. XI–XVII, 1904–1911 (*London, 1909, pp. 122; 1911, pp. 88*).—A subject index of these volumes.

NOTES.

California Station.—A bill recently signed by the governor appropriates $25,000 for a building and equipment at the Citrus substation at Riverside. Of this amount about $1,500 will be used in improving the irrigation system, $2,500 to complete the title for the building site and nursery grounds, about $2,000 for incidentals, and the remainder for building and equipping a soils laboratory for studying citrus soils as regards their chemical, physical, and biological phases.

Colorado Station.—V. M. Cone, in charge of irrigation work of this Office in central California, has been appointed irrigation engineer.

Guam Station.—A shipment of several Morgan horses and Ayrshire cattle is projected, with a view to the improvement of the live-stock industry of the island.

Louisiana University and Stations.—The stations recently equipped a car with exhibits of forage crops and corn and other illustrative material for a two-weeks' tour over the Rock Island Lines in conjunction with representatives of the extension department of the university. The car was visited by a great many farmers and very enthusiastic meetings were held at every point visited. Special attention was given to the organization of pig clubs, and about 400 boys have been enrolled in those thus far organized.

A truck farm has been established at Baton Rouge, partly to produce vegetables for the use of the university mess hall and partly to study the marketing of truck produce in the North. An irrigation plant with a 12-horsepower gasoline engine has been installed, between 300 and 400 gallons of water being supplied per minute to the main irrigation ditch. G. L. Tiebout, of the station staff, has been given charge of this farm.

The rice substation at Crowley has recently completed a barn and instrument building costing $2,000.

H. P. Agee, assistant director of the Sugar Station, has resigned to become assistant director of the Hawaiian Sugar Planters' Station. R. G. Tillery, assistant chemist, has accepted a commercial position.

Maryland Station.—The station is cooperating with the Baltimore County school board in conducting experiments and demonstrations with corn, potatoes, fertilizers, spraying, and hay crops. The work is under the immediate supervision of the faculty of the Baltimore County Agricultural High School. The station is also cooperating in a State exhibit of strawberries at Randallstown, under the auspices of the local high school.

G. H. Hibbard, of the Dairy Division of this Department, has been assigned to cooperative work in Maryland, with headquarters at the station. A. L. Stabler, assistant animal husbandman, and T. R. Stanton, assistant agronomist, have resigned, to accept positions respectively with the Baltimore County Agricultural High School and the Bureau of Plant Industry of this Department.

Massachusetts College.—George E. Story, assistant in extension work at the Ohio State University, has accepted the position of field agent.

Nevada Station.—At the last session of the legislature an appropriation of $2,000 was granted for the climatological work on Mount Rose, and $3,000 additional for general station work. The director has been designated by the governor to investigate the nature and causes of the eelworm in potatoes, for which an appropriation of $500 was granted. Control of the Elko County dry farm was taken from the station and vested in a commission to be appointed by the governor.

A temporary building was erected on the campus for use during commencement week for the exhibition of the station stock, many of which were prize winners at the California State Fair in 1910.

Hosea E. Reid, of Reno, and James W. O'Brien, of Sparks, have succeeded John Sunderland, jr., and J. J. Sullivan as members of the board of control. Frank L. Peterson has been added to the station staff as assistant in irrigation, beginning April 1.

New Hampshire College and Station.—The legislature at its recent session appropriated $7,000 for establishing a department of forestry at the college, $5,000 for a new horse barn for the college and station, $3,000 for live stock, $5,000 for extension work, and $1,500 for the publishing of information bulletins. This is the first time that special appropriations have been made by the State for extension work and publications to supplement the work of the station. The director of the station has been given supervision of the extension work.

New Jersey College Station.—E. W. Stafford, a graduate of the Ontario Agricultural College, has been appointed assistant in entomology.

Ohio Station.—The board of control, acting conjointly with the boards of county commissioners, has located county experiment farms in Belmont, Paulding, and Miami Counties under the Wilber law of 1910. The bonds voted for this purpose amount to $20,000 each in Belmont and Paulding Counties, and $22,000 in Miami County.

J. Warren Smith, section director of the weather service, has been appointed honorary climatologist of the station. George N. Coffey, of the Bureau of Soils of this Department, has accepted the position of assistant in the department of cooperation and will be engaged in a field study of the soils of the State.

South Dakota College and Station.—A. N. Hume, assistant chief in crop production in the Illinois University and Station, has been appointed agronomist, beginning July 1.

Washington College and Station.—The legislature, which has recently adjourned, appropriated for the ensuing biennium $485,000 for maintenance, $20,000 for farmers' institutes, and $30,000 for the Puyallup substation. A law was also passed providing a tax of 0.325 mill on the assessed valuation of the State for the support of the college and station for the years 1913 to 1918, inclusive. It is estimated that this tax will provide a revenue of $320,000 per year at the beginning of the period, and that this will probably be increased by $25,000 per year by the rise in the assessed valuation of the State. The fund is to be used for both maintenance and permanent improvements.

A. B. Nystrom, instructor in dairying in the college, has been made assistant professor of dairying in the college and dairy husbandman of the station. E. L. Peterson has resigned as assistant soil physicist of the station to engage in teaching in Minnesota, and has been succeeded by Henry F. Holtz, a 1911 graduate of the college. George Severance, until January 1, 1910, head of the agricultural department of the college and since that time engaged in commercial work, has been appointed superintendent of the Puyallup substation, vice W. H. Lawrence, whose resignation has been previously noted. L. J. Chapin, a 1911 graduate of the college, has accepted the position of agronomist at the substation.

Office of Experiment Stations.—C. H. Lane, formerly of the Tennessee University and subsequently editor of *Southern Farm Advocate*, and B. B. Hare, of the Interstate Commerce Commission, have been appointed assistants in agricultural education. The latter will also be in charge of the department of rural economics of *Experiment Station Record*, vice J. B. Morman, who has accepted a position in connection with the Harriman investigations of North American mammals.

Experiment Station at Burbage, England.—According to *Gardeners' Chronicle*, an experiment station has recently been organized at Burbage, Leicestershire, for the purpose of applying Mendelian methods of research to the practical breeding problems of agriculture, horticulture, and forestry. Commercial nurseries at Burbage, comprising over 100 acres, will be utilized for the experiments as far as possible.

At present the station staff is constituted as follows: Director, C. C. Hurst; recorder, J. B. Perkins; secretary, W. Harding; agriculturist, S. Evans; horticulturist, G. Geary; florist, G. Dakin; and poultry expert, J. Ward.

It is announced that every facility is to be offered to students and workers in genetics to carry out experiments at the station. Experiments are already under way with a large number of plants, including both orchard and ornamental trees, small fruits, vegetables, and flowers.

Eighth International Congress of Applied Chemistry.—According to a preliminary announcement as to the organization of this congress, it has been decided to hold the opening meeting in Washington, D. C., September 4, 1912. President Taft, who will also serve as patron of the congress, has consented to preside at this meeting. The remaining meetings, both business and scientific, will be held in New York City, from September 6 to 13, inclusive.

The congress is to be organized in eleven sections and subsections, of which that on agricultural chemistry has the following organization: President, F. K. Cameron, of the Bureau of Soils of this Department; vice president, H. J. Wheeler, of the Rhode Island Station; secretary, J. A. Leclerc, of the Bureau of Chemistry of this Department; and additional members of the executive committee, L. L. Van Slyke, of the New York State Station, and H. P. Armsby, of the Pennsylvania Institute of Animal Nutrition. The business address of the section is to be at the Bureau of Soils. In the subsection on Bromatology, W. D. Bigelow, of the Bureau of Chemistry of this Department, is president, A. L. Winton, of the Bureau of Chemistry, vice president, and Charles D. Woods, of the Maine Station, a member of the executive committee, with the Bureau of Chemistry of this Department the business address of the subsection. The official representatives of this Department on the organization committee include H. W. Wiley of the Bureau of Chemistry, W. W. Cooke of the Biological Survey, W. L. Hall of the Forest Service, F. K. Cameron of the Bureau of Soils, W. J. Humphreys of the Weather Bureau, M. Dorset of the Bureau of Animal Industry, R. H. True of the Bureau of Plant Industry, and C. F. Langworthy of this Office.

All papers accepted for presentation to the congress are to be printed prior to the meeting, and it is desired that they be received by the American committee in charge by July 1, 1912. An abstract should accompany each, as it is planned to restrict the actual time of presentation in each case to ten minutes.

Additional information may be obtained from the secretary of the congress, Dr. Bernard C. Hesse, 25 Broad Street, New York City.

Conference for Education in the South.—The Fourteenth Conference for Education in the South was held in Jacksonville, Fla., April 19–21, with its general subject the Redirection of Education for Rural Communities.

Speakers of prominence from all parts of the country and some representatives of foreign countries described successful efforts to adapt school instruction to the wants of rural communities. Dr. Paul Ritter, envoy extraordinary and minister plenipotentiary from the Republic of Switzerland, spoke on the

Adaptation of Education to Life in Switzerland; Count Carl Moltke, envoy extraordinary and minister plenipotentiary from the Kingdom of Denmark, on the Cooperative Movement in Denmark and the Benefits Derived Therefrom by the United States; Dr. H. B. Frissell, on the Movement for Agricultural Cooperation in Ireland; Dr. J. C. Bay, on the Folk High School and Rural Life of the Scandinavian Countries; and Clarence Poe, on Some Lessons from the Orient.

Among the addresses on phases of rural-life instruction in this country were an illustrated talk on the Reconstruction of the One-room Rural School, by Miss Jessie Fields, superintendent of schools, Page County, Iowa, and an address on Some Results of the Application of Newer Ideals in Education, by O. H. Benson, of this Department, who described boys' corn club work, public-school agricultural exhibits, and other features of rural-school improvement in Wright County, Iowa.

Dr. J. L. Coulter, of the University of Minnesota, described typical instances of rural cooperation in America. D. C. Ellis, of the Forest Service, gave an illustrated lecture on the Relation of Our Forests to Wealth and Life, and called particular attention to the need of instruction concerning these matters in the public schools.

At a meeting of Southern State superintendents, Superintendent J. Cook, of Columbus, Miss., read a Review of Progress in Southern Education, calling attention briefly to features of progress in each of the Southern States. Among the more important items relating to country-life education were mentioned legislation permitting consolidation by transportation in Arkansas; the organization of a conference on education in Florida to consider departments of manual training, agriculture, business, and domestic science in public high schools; the increase in the annual income of Georgia agricultural schools to $10,000 for each school; the maintenance of 5 summer schools for white teachers and 2 for colored teachers, and the establishment of 17 departments of agriculture in county high schools in Louisiana, each school receiving an equal share of $25,000 from the State; the establishment of a State normal school and of 23 State-aided county agricultural schools in Mississippi; legislation in North Carolina for the establishment of State-aided country-life schools, an increase in taxation for elementary public schools, and an increase in the appropriation for rural high schools; the stimulation of agricultural education in South Carolina by the organization of boys' corn clubs, and of home economics instruction by the organization of tomato clubs among the girls; the organization in Texas of State-aided departments of agriculture, home economics, and manual training in 10 public high schools, and of similar departments for teachers in 4 State normal schools and the State University; and the addition of $10,000 to the total appropriations for departments of agriculture and home economics in Virginia high schools. State rural-school supervisors are now employed in nearly all of the Southern States.

At an afternoon conference on Education for Larger Productiveness on the Farm, with President A. M. Soule presiding, President J. C. Hardy discussed the functions of the agricultural college; H. A. Morgan, of Tennessee, spoke on the training of teachers of agriculture and the development of short courses to take the place of farmers' institutes; and J. F. Duggar emphasized the importance of cooperation among all the southern educational agencies. The work of the consolidated Farragut School, at Concord, Tenn., in teaching agriculture and home economics, conducting demonstration plats, and affording social entertainment for the people of the community, was described by its principal, Adam Phillips.

There was also a conference on Education for Better Living in the Country Home, which was led by Mrs. W. N. Hutt, of North Carolina. Among other topics of importance that were discussed either at conferences or at meetings of affiliated societies were the rural school and sanitation, the church and country life, the high school and its relation to life, the school and civic improvement, and the education of the negro.

Agriculture in the Common Schools of Ohio.—The General Assembly of Ohio has passed a bill requiring that agriculture be taught in all the common schools of that State except those in city school districts. This bill also provides for dividing the State into four agricultural districts and the appointment by the state commissioner of common schools of a superintendent of agricultural education for each district.

Agricultural School in Honduras.—Consul A. T. Haeberle, of Tegucigalpa, announces that an agricultural school has been established in the Episcopal Palace at Siguatepeque, under the direction of H. A. Owen, an American. The municipality gave 130 acres, and 50 acres and buildings have been leased, making altogether 180 acres at the disposal of the school.

There will be on the farm a sufficient number of cattle and horses and the boys will be taught to handle modern farm implements. Food stuffs will be raised for the consumption of the school and experiments will be made with different grasses and wheat. It is stated that a number of people in the United States are interested in the school, and that several men of practical experience have offered their services, among others a wealthy cattleman who intends to send cattle for breeding purposes.

A Special Agricultural Train in Mexico.—The *Mexican Daily Herald* announces that Zeferino Dominguez, a well-known agricultural expert, is preparing a series of lectures on the selection of seed corn, use of modern agricultural implements, care of the soil, and best methods to use in dry farming, to be delivered this spring and to extend over a period of six or seven weeks. A special agricultural train will take him around the Republic and practically every city in the country will be visited.

Grenada Agricultural Department.—The *Agricultural News* of Barbados states that an agricultural board has been organized to direct the work of the local department of agriculture in consultation with the Imperial Department of Agriculture. G. G. Auchinleck has been appointed superintendent of agriculture to succeed R. V. Anstead, who has resigned to take up agricultural work under the United Planters' Association of Southern India. The gardens have been placed under the care of the agricultural instructor.

Necrology.—Jacobus Henricus van't Hoff, professor of physical chemistry in the University of Berlin, and member of the Imperial Academy of Sciences, died March 1, 1911, at Steglitz, near Berlin, at the age of 58 years.

Prof. van't Hoff made valuable contributions to science in various fields, but especially in the field of physical chemistry. The crowning work of his career was his studies on the formation of oceanic salt deposits, especially as exemplified in the German potash deposits at Stassfurt. This work fully illustrated the principles underlying the formation of these and similar deposits which are of such vast industrial and agricultural importance. As stated by a writer in *Nature*, the successful accomplishment of the researches formed "a fitting close to a life of strenuous work and extraordinary scientific fertility."

Noel Bernard, professor of the faculty of science of Poitiers, died recently at the age of 36 years. He is noted for his investigations relating to the germination of orchids and the symbiotic relation of fungi with the development of the plants. Some of his papers have been noted previously (E. S. R., 14, p. 635; 22, p. 133).

Dr. Edward Zacharias, director of the Hamburg Botanic Garden and professor of botany in the University of Hamburg, died March 23, 1911, at the age of 59 years.

New Journals.—The *Journal of the New Zealand Department of Agriculture* has been established with a view to getting results before the farmers more promptly and frequently than was possible with the annual report which has hitherto formed practically the sole medium of communication. The report will continue to be published but will become merely a brief review of the work in hand, while the journal, which will be issued monthly, will report the results of investigations and otherwise serve as the organ of the department. The principal articles in the initial number are entitled The Natural Pastures of New Zealand, Solid Straw Tuscan Wheat, The Pakihi Soils of Westland, and notes on the Formation and Working of Cooperative Dairy Factory Companies.

The *Pomona College Journal of Economic Botany* is being published quarterly, beginning with February, by the department of biology of Pomona College. Its purpose is defined as "first and foremost in the interest of the scientific development of the new subtropical horticulture." The initial number consists of the following articles: The Avocado in Southern California, by F. W. Popenoe; The Wither-tip in Ventura County, by E. O. Essig; Biological Expedition to Southern Mexico, by D. L. Crawford; and The Botanic Garden of Para, by C. F. Baker.

The *Progressive Eastern Fruitgrower*, edited by J. S. Gallagher with an advisory board of editors at present consisting of L. H. Bailey and C. S. Wilson, is being issued as a monthly magazine devoted to the upbuilding of fruitgrowing in eastern America. The initial number contains among others an article on Apples of the Fameuse Type, by F. A. Waugh, of the Massachusetts College and Station, and The Gospel of Pruning, by U. P. Hedrick, of the New York State Station.

Rivista Scientifica del Latte is being issued as a quarterly supplement to *Industria Lattiera e Zootecnica*, with Prof. Giuseppe Fascetti, of the school of agriculture of the University of Pisa, as editor. The initial number contains the following articles: Studies of Bitter Cheese, by Prof. Fascetti; Interpretation of Analytical Results in Studies on the Watering of Milk, by R. Sanfelici; The Use of Oleomargarine in Calf Feeding, by C. Besana; and Photography and Zootechny, by E. Reggiani.

The Journal of Meat and Milk Hygiene is a monthly review devoted to "securing for Great Britain and Ireland an efficient supply of meat and milk." Original articles are presented in the initial number on Meat Poisoning, Its Nature, Causation, and Prevention, by E. J. McWeeney; The Occurrence of Actinomycosis in Cows' Udders, by J. H. Patterson; and On the Public Slaughterhouse System of Scotland, by F. Dittmar. In addition, notes, abstracts, reviews, etc., are included.

The Agricultural Journal of the Union of South Africa is being issued monthly in both English and Dutch editions, superseding *Agricultural Journal of the Cape of Good Hope*, *Natal Agricultural Journal*, and *Transvaal Agricultural Journal*.

The Department of Agriculture of the State of Parahiba, Brazil, has established *Boletim de Agricultura* as its official organ. Its initial numbers contain brief articles by members of the staff, reprints from other publications, and notes.

Pecuaria, a review of the live stock industry, is being issued monthly at Havana. It is stated to be the only journal of the sort now published in Cuba.

○

EXPERIMENT STATION RECORD.

Editor: E. W. ALLEN, Ph. D., *Assistant Director.*
Assistant Editor: H. L. Knight.

EDITORIAL DEPARTMENTS.

Agricultural Chemistry and Agrotechny—L. W. Fetzer, Ph. D., M. D.
Meteorology, Soils, and Fertilizers {W. H. Beal. B. W. Tillman.
Agricultural Botany, Bacteriology, Vegetable Pathology {W. H. Evans, Ph. D. W. H. Long.
Field Crops {J. I. Schulte. J. O. Rankin.
Horticulture and Forestry—E. J. Glasson.
Foods and Human Nutrition—C. F. Langworthy, Ph. D.
Zootechny, Dairying, and Dairy Farming—E. W. Morse.
Economic Zoology and Entomology—W. A. Hooker.
Veterinary Medicine {W. A. Hooker. L. W. Fetzer.
Rural Engineering—— ——
Rural Economics—B. B. Hare.
Agricultural Education—D. J. Crosby.

CONTENTS OF VOL. XXIV, NO. 8.

SUBJECT LIST OF ABSTRACTS.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

METEOROLOGY—WATER.

SOILS—FERTILIZERS.

AGRICULTURAL BOTANY.

FIELD CROPS.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

FOODS—HUMAN NUTRITION.

ANIMAL PRODUCTION.

DAIRY FARMING—DAIRYING.

VETERINARY MEDICINE.

LIST OF EXPERIMENT STATION AND DEPARTMENT PUBLICATIONS REVIEWED.

NOTE.—The price of *Experiment Station Record* is $1 per volume, and two volumes are issued annually. It may be purchased from the Superintendent of Documents, Washington, D. C., to whom all remittances should be made. The publications of the State experiment stations are distributed from the stations and not from the Department.

EXPERIMENT STATION RECORD.

VOL. XXIV. ABSTRACT NUMBER. NO. 8.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

The formation of carbohydrates in the vegetable kingdom, W. McPHERSON (*Science, n. ser., 33 (1911), No. 839, pp. 131–142*).—A summary and digest of data regarding the formation of carbohydrates from the standpoint of both botany and chemistry.

The hydrolysis of starch and its products by hydrogen peroxid, MRS. Z. GRUZEWSKA (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 22, pp. 1084–1086*).—The hydrolysis of starch can be brought about by hydrogen peroxid at 37° C. with the formation of erythrodextrin, achrodextrin, and maltose, but no glucose. Of the 5 polysaccharids treated with hydrogen peroxid 3 yielded dextrin, namely, starch, glycogen, and mannogalactan. Inulin and xylan did not.

Concerning the basic constituents of bamboo sprouts, G. TOTANI (*Ztschr. Physiol. Chem., 70 (1911), No. 4–5, pp. 388–390*).—Cholin and betain were identified as present in the juice of fresh bamboo sprouts.

In regard to the betains occurring in plants, E. SCHULZE and G. TRIER (*Ztschr. Physiol. Chem., 67 (1910), No. 1, pp. 46–58; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 15–16, pp. 690, 691*).—After briefly reviewing those plants which contain betain ($C_5H_{11}NO_2$), trigonellins ($C_7H_7NO_2$), and stachydrins ($C_7H_{13}NO_2$), the authors state that in all probability these compounds are secondary products of metabolism which enter no further into the physiological processes of the plant. For instance, stachydrin, which is the methyl betain of hygrinic acid, stands in close relation to prolin because the latter on complete methylization of the nitrogen is converted into stachydrin. For preparing the betain the authors utilize mercuric chlorid and phosphotungstic acid as the precipitating agents. The detailed process of separating the various betains is given.

About the betains occurring in plants, etc., R. ENGELAND (*Ztschr. Physiol. Chem., 67 (1910), No. 4–5, pp. 403, 404; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 17–18, p. 780*).—A polemical article (see above).

The formation of δ-gluconic acid by Bacterium savastanoi, C. L. ALSBERG (*Jour. Biol. Chem., 9 (1911), No. 1, pp. 1–7*).—Continuing previous work (E. S. R., 23, p. 611) the author finds that the product formed by *B. savastanoi* from dextrose is almost entirely δ-gluconic acid. This is probably the first record of the production of this acid by a pathogenic organism. The amount of energy liberated by this oxidation of the glucose is assumed to be 58 calories, or 8.6+ per cent of the total energy obtained by the complete combustion of glucose. Calculated approximately, this organism daily converts an amount of energy equivalent to 448.4 calories per kilogram of its weight.

A method for determining the electrical conductivity of the interior of the cell, R. Höber (*Pflüger's Arch. Physiol., 133 (1910), No. 4–6, pp. 237–253, figs. 7*).—The author has worked out a method for measuring the electrical conductivity of the interior of the blood cell within a limit of error of from 1 to 2 per cent.

The principle of the method rests upon the factor of knowing whether or not the capacity of the trough is changed when a cell is brought into the dielectron. In this manner he found that blood corpuscles, which have practically no electrical conductivity when measured according to Kohlrausch's method, have an internal electrical conductivity which corresponds to that of tenth-normal potassium chlorid solution.

Further observations of the effects of ions on the activity of enzyms, W. N. Berg and W. J. Gies (*Proc. Soc. Expt. Biol. and Med., 4 (1906), No. 1, pp. 17–19*).—The authors briefly summarize the results of a study of the peptolysis of many proteins in a given series of acid solutions. That acid molecules are not necessarily inhibitory in peptolysis is apparent from data reported in which acetic acid was used instead of sulphuric acid.

From the data obtained and the results of similar experiments with acetic acid, the authors conclude that new light is thrown "on the well-known fact that peptolysis is almost negative in solutions of acetic acid alone. This lack of peptolytic efficiency on the part of acetic acid is apparently due to the low hydrion concentration of acetic acid solutions. The acetic acid molecules and anions, in the proportions above indicated, seem to be practically inert. It is obvious that peptolysis is neither favored nor interfered with materially by moderate amounts of acetic acid, a fact which suggests that the purely chemical phases of the normal gastric digestive process are practically unaffected by vinegar. Secretory conditions, however, are no doubt modified."

It is stated that the investigations will be continued.

The relation between the physiological effect of ions and their physical-chemical properties, W. N. Berg (*Ion, 2 (1910), No. 3–4, pp. 161–188*).—A large amount of data is summarized and discussed with reference to theories of physical chemistry.

The composition of invertase, A. P. Mathews and T. H. Glenn (*Jour. Biol. Chem., 9 (1911), No. 1, pp. 29–56*).—Invertase prepared from yeast by O'Sullivan and Tomson's method of self-digestion and precipitation with alcohol was found to consist of a gum, a mannosan, and a nitrogen-containing portion. A rough parallelism was found between activity and nitrogen content.

"It is suggested that what is ordinarily called invertase is a union of an inactive colloidal gum, with an active protein ferment. The active principle may be an albumose or a coagulable albumin. This union is inert and the ferment is thus tied up in the cell. The union of carrier and enzym constitutes the invertase zymogen. By the action of acid, the ferment is freed from its carrier, the gum, and becomes capable of uniting with and changing its substrat. The action of acids in cell physiology, and in hastening the action of invertase and other enzyms is thus partially explained. Diastase would appear to be a union of an albumose enzym with a pentose gum. It is suggested that possibly the ferments are thus anchored and rendered inert in cells by uniting them with colloids. The name 'carrier' is suggested to cover these colloidal substances, the carriers of the ferments. The carriers appear to be usually of the same chemical nature as the substrat of each ferment and to be colloids.

"A little over 12 per cent of the weight of the invertase is still unaccounted for, though a part of this may be water. Until this is accounted for, and until the parallelism between nitrogen content and activity be found to be more exact the foregoing conclusion that the ferment is a protein must be tentative. Further work on the subject is in progress."

Influence of temperature upon the activity of cellase, G. BERTRAND and A. COMPTON (*Bul. Soc. Chim. France, 4. ser., 9 (1911), No. 2, pp. 100–103, fig. 1*).—The optimum temperature of the cellase obtained from sweet almonds was found in the region of 46° C. The action of this enzym is absolutely destroyed at 75° and under certain circumstances this occurs at 60°.

Methods of volumetric analysis, H. BECKURTS (*Die Methoden der Massanalyse. Brunswick, 1910, vol. 1, pp. VII+482, figs. 87*).—This is virtually a completely revised edition of Mohr's Lehrbuch der Chemisch-Analytischen Titriermethode, with many important additions.

A study of melting point determinations, G. A. MENGE (*Pub. Health and Mar. Hosp. Serv. U. S., Hyg. Lab. Bul. 70, pp. 101, figs. 21*).—After considering the numerous existing methods for determining the melting point the author describes a method, devised by the division of pharmacology of the U. S. Public Health and Marine Hospital Service, for the purpose of recommending it to the committee of revision of the U. S. Pharmacopœia for adoption as official in standardizing drugs.

An improvement of the Folin method for the determination of urinary ammonia nitrogen, M. STEEL (*Jour. Biol. Chem., 8 (1910), No. 5, pp. 365–379*).—After discussing the various methods, the results obtained with them, and the sources of error, the author presents his modification of the Folin method,[a] so that it can be made to liberate all the ammonia from ammonium magnesium phosphate and at the same time be applied to urinary analysis. This is accomplished by the addition of sodium hydrate instead of sodium carbonate and the addition of sodium chlorid. Ordinary organic constituents of urine are not decomposed by the amount recommended. See also a note by Kober (E. S. R., 23, p. 416).

Note on the determination of ammonia in urine, O. FOLIN (*Jour. Biol. Chem., 8 (1910), No. 6, pp. 497, 498*).—The correctness of Steel's method (see above) is pointed out, but in view of the fact that the amount of ammonium magnesium phosphate is usually very small in urines, since these are often decomposed or alkaline, the author believes it hardly necessary to substitute sodium hydrate and sodium chlorid for sodium carbonate and sodium chlorid.

About the estimation of phosphates, CRISPO (*Abs. in Chem. Ztg., 34 (1910), No. 80, p. 717*).—It is concluded that Pemberton's method (E. S. R., 20, p. 703) gives the best results and in the shortest time.

Improvements in the Knorr fat extraction apparatus, H. L. WALTER and C. E. GOODRICH (*U. S. Dept. Agr., Bur. Chem. Circ. 69, pp. 4, figs. 4*).—One of the modifications proposed consists of making two perforations in the neck of the flask for the purpose of eliminating certain difficulties in manipulation which often present themselves with the old flask. The others consist of a metal spring, which is placed in the extraction tube to hold the material being extracted in place during the process, and a new form of metal disk. With these modifications applied it is possible to return to the use of a cheaper and simpler form of extraction tube.

A method for the determination of sodium iodid in animal tissues, P. J. HANZLIK (*Jour. Biol. Chem., 7 (1910), No. 6, pp. 459–464; abs. in Zentbl.*

---

[a] Ztschr. Physiol. Chem., 37 (1902), p. 161; Amer. Jour. Physiol., 8 (1902–3), p. 330.

Biochem. u. Biophys., *10* (*1910*), *No. 17–18*, *p. 781*).—The finely minced material, after adding from 3 to 5 cc. of a 40 per cent sodium hydrate solution, is dried at a temperature not exceeding 100° C., and carefully heated over a flame, and charred. A mixture of equal parts of sodium nitrate and sodium carbonate is added in small amounts until oxidation is complete and the ash is white in color. The cooled mass is taken up with water, the filter washed until it is free from iodin, and the filtrate made up to a definite volume. Aliquot parts are then shaken in a separatory funnel with from 10 to 15 cc. of concentrated sulphuric acid, a crystal of sodium nitrate added, and the free iodin extracted with several portions of chloroform (10 cc. each time) until the chloroform does not take on a violet color. The chloroform solution is washed free from acid with distilled water and titrated with a tenth-normal thiosulphate solution. The method determines, on the average, 97.77 per cent of the iodin present.

Phosphorus in beef animals, C. K. Francis and P. F. Trowbridge (*Jour. Biol. Chem.*, *7* (*1910*), *No. 6*, *pp. 481–501*).—This is a study of methods, as well as of the distribution of the phosphorus in the animal carcass.

The authors conclude that "a method which involves heating of the solution before precipitation of the inorganic phosphorus does not yield results which represent the true condition of the soluble forms of phosphorus compounds in cold water extracts of beef. Soluble organic phosphorus compounds existing in beef and in cold water extracts of the same, are converted into inorganic forms by heat. The change is practically complete when the temperature is maintained at 70° for 15 minutes. From 52 to 65 per cent of the total phosphorus in cold water extracts is in the organic form, but may be reduced to from 9 to 20 per cent if heated to about 70°, accompanied by a corresponding increase of the inorganic phosphorus.

"The round cut of beef contains more phosphorus, in forms which are soluble in cold water, than any of the other cuts. Phosphorus is found chiefly in the muscular or connective tissue; the fats contain but little. The flesh of a thin animal contains more soluble phosphorus than that of a fat animal. The quantity decreases with increasing fatness even when it is expressed on a moisture and fat-free basis."

The determination of inorganic and organic phosphorus in meats, H. S. Grindley and E. L. Ross (*Jour. Biol. Chem.*, *8* (*1910*), *No. 6*, *pp. 483–493*).—According to these authors the Hart-Andrews method as modified by Emmett and Grindley (E. S. R., 17, p. 887), the magnesia mixture method of Forbes et al. (E. S. R., 23, p. 303), and the barium chlorid method of Siegfried and Singewald (E. S. R., 17, p. 635), when utilized with the necessary precautions yield almost the same results for the inorganic phosphorus content in the watery extract of beef. "Judging from the data here presented it is evident that the coagulation of the protein of the aqueous extracts of flesh by heat does not change organic phosphorus to the inorganic form to any appreciable extent."

See also previous notes (E. S. R., 23, p. 512; and above.)

Detection and determination of saccharin in food rich in fats, starch, and proteids, P. Tortelli and E. Piazza (*Ann. Falsif.*, *3* (*1910*), *No. 22*, *pp. 313–320*).—Previously noted from another source (E. S. R., 24, p. 124).

A new method for the quantitative estimation of saccharose in the presence of other sugars, A. Jolles (*Pharm. Zentralhalle*, *51* (*1910*), *No. 42*, *pp. 957, 958*; *Monatsh. Chem.*, *32* (*1911*), *No. 1*, *pp. 1–7*).—Saccharose can be determined quantitatively according to 3 methods, which have for their basis the following: (1) After boiling for $\frac{3}{4}$ hour with a tenth-normal alkali solution, utilizing the reflux condenser, there is no rotation of dextrose and similar sugars in the mixture, whereas the saccharose remains undisturbed. (2) The mixture of sugars is heated in a Lintner pressure bottle with tenth-normal alkali for $\frac{3}{4}$ hour in a boiling water bath. (3) The mixture of sugars is allowed to stand in contact with tenth-normal alkali for 24 hours in a thermostat at 37° C.

All 3 methods give good results, the third being given the preference as it has the additional advantage of taking on the least amount of coloration. In all the methods, dextrose, levulose, invert sugar, etc., must not exceed 2 per cent.

[The use of caustic potash for breaking down reducing sugars in sugar-house products as a preliminary for determining raffinose], H. Pellet (*Amer. Sugar Indus. and Beet Sugar Gaz., 13 (1911), No. 1, pp. 6, 7*).—It is pointed out in this article that the utilization of caustic potash to break down the reducing sugars was proposed by H. Pellet[a] over ten years ago.

The estimation of lactose in the presence of the commonly occurring sugars, J. L. Baker and H. F. E. Hulton (*Analyst, 35 (1910), No. 417, pp. 512–516*).—As a direct estimation of lactose in the presence of other sugars which reduce Fehling's solution is impossible, the authors sought to utilize the fermentation test, based on the non-fermentability of lactose, with washed brewers' yeast (0.5 gm. of yeast to 100 cc. of a 2 to 3 per cent sugar solution held for from 60 to 70 hours at 25° C.). When pure solutions of lactose were employed the amount of lactose fermented was found to be 5 per cent, with equal weights of lactose, glucose, and maltose 0 per cent, with wheat starch containing 10 per cent of lactose 0 per cent, and with flour with 10 per cent of lactose 3 per cent.

The oxidation index of milk, T. Jona (*Gaz. Chim. Ital., 40 (1910), II, No. 5–6, pp. 414–416; Bol. Soc. Med. Chirurg. Pavia, 24 (1910), No. 2, pp. 202–207; abs. in Chem. Zentbl., 1910, II, No. 17, p. 1328*).—The previous work of Comanducci (E. S. R., 18, p. 872) has shown that a creamed milk has a lower total oxidation index than a milk containing its total cream. The serum of a creamed milk has the same index as that of a normal milk, but a milk containing water has a lower index for its serum. By determining the oxidation index of both the milk and the serum it is, therefore, possible to detect substances added to the milk, or the removal of the cream.

To carry out the method 5 cc. of milk is diluted to 500 cc. with water, 20 cc. of sulphuric acid (1:5) added, heated on the water bath to from 60 to 70° C., and then tenth-normal potassium permanganate added dropwise, until a permanent pink color remains for 10 minutes. The number of cubic centimeters of permanganate used per cubic centimeter of milk equals the oxidation index. For the serum the process is the same, with the exception that the casein, etc., is previously precipitated by adding to 100 cc. of the milk in a flask attached to a reflux condenser 2 cc. of a 20 per cent solution of acetic acid, placing this in the boiling-water bath for 10 minutes, then rapidly cooling and filtering.

As a result of the examination of the milk from 200 cows the oxidation index for milk was found to be on the average from 43 to 45; for the serum it was from 36 to 38.

A new method for determining the lactose and the fat content of milk, T. Jona (*Gaz. Chim. Ital., 40 (1910), II, No. 5–6, pp. 419–424; Bol. Soc. Med. Chirurg. Pavia, 24 (1910), No. 2, pp. 178–184; abs. in Chem. Zentbl., 1910, II, No. 17, pp. 1328, 1329*).—The author, utilizing the principles involved in the work noted above, finds that the number of cubic centimeters of tenth-normal potassium permanganate used have a direct relation to the fat present in the

[a] Bul. Assoc. Chim. Sucr. et Distill., 15 (1897), No. 6, p. 611.

milk, so that by multiplying the difference between the number of cubic centimeters of permanganate used for the milk and the number utilized for the serum by 0.49 the percentage of fat is obtained approximately. For estimating the lactose the number of cubic centimeters of permanganate used for the serum are multiplied by 0.1401. The author also finds that 1 cc. of tenth-normal potassium permanganate oxidizes the same amount of glucose, sucrose, or lactose.

Investigation of caseins and cheese curds, A. Burr (*Milchw. Zentbl., 6 (1910), No. 9, pp. 385–394*).—After reviewing the technical and dietetic uses of casein, the geographical distribution of the various casein factories, and the published analyses of commercial casein, the author reports his findings on the examination of caseins and paracaseins prepared by himself.

The moisture in the air-dried (at about 30° C.) acid casein fluctuated between 5.55 and 9.62 per cent, while that dried at 65° contained only 1.65 per cent. The moisture was similar in the rennet casein. The ash content of the rennet casein was from 5 to 8.55 per cent (P_2O_5 60.64, Ca 37.44, and Mg 0.088 per cent), while that of the acid casein was practically nil. The amount of nitrogen in the acid casein, on the basis of fat- and ash-free dry substance, ranged from 15.58 to 15.63 per cent, which yields a casein factor of practically 6.41 per cent, while that of the paracasein was from 6.35 to 6.39 per cent, an average of 6.363. The results of the examination of the acid curds showed that the water content fluctuated between 73.08 and 80 per cent, an average of 76.70 per cent.

The differences in ash content of the acid and rennet curds, noted by Hoft (E. S. R., 22, p. 702), were substantiated by the author. Some further tests are reported, which have reference to ascertaining (1) how much the fat content of the dry mass of the relatively fresh sugar-containing curd and the sugar-free curd diminish, and (2) whether a marked difference exists in fat content of 3 to 4-day-old curds, made from the same milk by the combined action of acid and rennet but under a variety of conditions, e. g., some with a greater concentration of acid and the others with a greater concentration of rennet. On the basis of these tests, the author cautions against setting up too definite limits for fat in the dry substance of fresh cheese curds containing sugar, such as were prepared for ripe or nearly ripened cheese.

On the importance of mineral salts in vinegar fermentation, H. Wuestenfeld (*Pure Products, 6 (1910), No. 11, pp. 646–648*).—This is a short review of the literature on this subject.

The conserving of crabs and examination of crab conserves, P. Buttenberg (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 6, pp. 311–323*).—A study in regard to the preservation of North and East Sea, Norwegian, and American crabs with various antiseptics, including boric acid, benzoic acid, salt, citric acid, etc.

The tomato and its derivatives, E. Collin (*Ann. Falsif., 3 (1910), No. 25, pp. 459–469, figs. 10*).—After discussing the botany, histology, and uses of the tomato, the author describes the various methods of conserving tomatoes and the methods for detecting impurities and adulterations in tomato products.

Preserved mushrooms, K. Weinhausen (*Pure Products, 6 (1910), No. 11, pp. 645, 646*).—A description of the methods for selecting and conserving mushrooms as practiced in Europe.

The sterilization and other after-treatment of fruit juices, E. Walter (*Pure Products, 6 (1910), No. 11, pp. 630–634, figs. 2*).—After discussing the use of chemical preservatives for the preservation of fruit juices, the author gives a detailed description of methods for sterilizing these products and the apparatus required therefor.

The equipment and operation of a modern factory for the production of fruit juices, E. Walter (*Pure Products, 6 (1910), Nos. 10, pp. 561–565; 11, pp. 627–630, figs. 10*).—A general discussion of the principles involved and machinery required.

Sugar, G. Martineau (*London and New York, [1910], pp. IX+149, pl. 1, figs. 18, dgm. 1, map 1*).—A popular discussion of the cane and beet sugar industry of the world, considering cane and beet juices, clarification, crystallization, sugar refining, the cane and beet industries, competition, the sugar market, consumption, production, imports, exports, and results in a German sugar factory in the season of 1908–9.

Sugar, cellulose, and alcohol manufacture from corn stalks, G. Doby (*Chem. Ztg., 34 (1910), No. 149, pp. 1330, 1331, figs. 2; abs. in Ztschr. Spiritusindus., 34 (1911), No. 1, p. 2*).—This article deals with the results of tests with corn stalks for the production of saccharose, cellulose, and alcohol. The amount of saccharose from the fresh stalks in Hungary (9 to 12 per cent) was found to be somewhat lower than in the United States (12 to 14 per cent).

The storage of feed beets, diffusion cossettes, and beet foliage, A. Zaitschek (*Kisérlet. Közlem., 13 (1910), No. 6, pp. 749–761*).—It was found that in storing feed beets of the Magyar type, 14.6 per cent of the digestible organic substance was lost of which more than half consisted of sugar. In the case of the diffusion cossettes from 19 to 44 per cent of the digestible matter disappeared, the amount lost being dependent upon the time of storage. This loss could not be checked by the use of the lacto-pulp method. Beet foliage suffered a loss of 37.4 per cent.

Utilization of the by-products of the vine and wine manufacture, V. Vermorel and E. Dantony (*Utilisation des Sous-Produits de la Vigne et du Vin. Paris, 1910, pp. VII+166, figs. 10*).—This work deals with the extraction of alcohol, tannin, and oil, the purification of the tartrates, the manufacture of verdigris and fertilizers, the utilization of the stems and similar topics.

Report of the city chemist of Gottenborg for 1909, J. E. Alén (*Årsber. Stadskem. Lab. Göteborg, 1909, pp. 15*).—A summary of the results obtained in the examination of foods, feeding stuffs, chemicals, and chemical-industrial products (including arsenic and wood pulp) is given in this report.

[Report of Danish chemical laboratories] (*Tidsskr. Landökonomi, 1910, Nos. 7, pp. 434–458, 459–480; 8, pp. 538–549*).—A summary and results of chemical analyses of dairy products, feeding stuffs, fertilizers, and other agricultural products at the Stein analytical laboratory in Copenhagen are given and discussed briefly by F. Christensen, together with similar reports of the work of other Danish agricultural chemical laboratories for 1909.

General index to Biedermanns Zentralblatt für Agrikulturchemie, M. P. Neumann (*General-Register zu Biedermanns Zentralblatt für Agrikulturchemie, Band XXVI bis XXXV. Leipsic, 1907, pp. 244*).—This is the general index from 1897–1906.

General index to Jahresbericht für Chemie, 1897–1904, E. Fromm (*General-Register zum Jahresbericht für Chemie, 1897–1904. I, Autoren-Register. Brunswick, 1910, pp. 847*). This is the combined author and subject index from 1897–1904.

METEOROLOGY—WATER.

Connecticut weather review, W. M. Esten and C. J. Mason (*Connecticut Storrs Sta. Bul. 64, pp. 155–187, charts 7*).—This bulletin summarizes observations on temperature at Storrs for 1909 and 21 preceding years, and on rainfall for a like period at Storrs and at 20 other places in the State. Five temperature curves showing the mean and variations of temperature for 21 years are given. The summary for the period is as follows: *Temperature* (degrees F.).—Mean, 46.9; highest, 96, July 5, 1898; lowest, —13.3, February 17, 1896; greatest range, 110. *Rainfall* (inches).—Mean, 45.78; greatest annual, 66.51, 1901; least annual, 33.33, 1894; greatest monthly, 12.24, July, 1897; least monthly, 0.37, February, 1907; greatest daily, 4.26, June 21, 1903. *Duration of growing season.*—Longest, 184 days, April 18 to October 19, 1901; shortest, 131 days, May 24 to October 2, 1907. *Average dates of frost.*—Last, May 5; first, October 8. *Wind.*—Prevailing direction, northwest.

Meteorological records for 1909 (*New York State Sta. Rpt. 1909, pp. 557–570*).—Tables are given showing tridaily readings at Geneva, N. Y., of standard air thermometers for each month of the year; daily readings of maximum and minimum thermometers at 5 p. m. for each month of the year; a monthly summary of maximum, minimum, and standard thermometer readings; average monthly and yearly temperatures since 1882; monthly and yearly maximum and minimum temperatures from 1883 to 1909, inclusive; and rainfall by months since 1882.

Weather summary, L. R. WALDRON (*North Dakota Sta., Rpt. Dickinson Substa. 1910, pp. 83–85*).—Tables give data for the Dickinson substation as to evaporation and precipitation during the growing seasons of 1907 to 1910, the monthly precipitation and temperature 1906 to 1910, and dates of early and late frosts during the same period.

Meteorological summary for 1909, C. A. PATTON (*Ohio Sta. Bul. 220, pp. 641–659*).—This summary includes as usual notes on the weather of each month of the year and tabulated daily and monthly records of observations at the station at Wooster, Ohio, on temperature, precipitation, cloudiness, and direction of the wind, and for comparison, similar data for 22 previous years (1888–1909) at the station and for 27 years (1883–1909) in other parts of the State.

The mean temperature for the year at Wooster was 50° F., for the State 50.7°; the highest temperature at the station was 90°, September 14, for the State 97°, July 30; the lowest temperature at the station was —11°, January 13, for the State —20°, December 30. The annual rainfall at the station was 44.22 in., for the State 42.32 in. The number of rainy days at the station was 144, for the State 124. The prevailing direction of the wind was southwest at the station and for the State.

Moisture studies in corn and wheat plats, L. R. WALDRON (*North Dakota Sta., Rpt. Dickinson Substa. 1910, pp. 60–76, dgms. 7*).—The moisture content under corn and wheat grown on spring-plowed, fall-plowed, summer-fallowed, and cropped soils was determined at different dates from November, 1909, to October, 1910.

Summer fallowing increased and continuous cropping decreased the moisture content of the soil. Spring-plowed soil contained less moisture than fall-plowed, but no very definite relation between yields and moisture content was established. The moisture content to a depth of 10 ft. was much smaller in the wheat plats than in the corn plats.

The amount of water used by corn crops during 4 years plus the amount found in the soil at the end of the period was about 41 in. The amount used by the wheat crop under like conditions was 46 in. As the rainfall during the period was about 80 in., the loss of water was from 55 to 60 per cent, the loss being greater in the case of the corn plats than in that of the wheat plats. The greater loss in the case of the corn was due to the sinking of the water to a greater depth than 10 ft.

Surface water supply of the Great Basin, 1909, E. C. LA RUE and F. F. HENSHAW (*U. S. Geol. Survey, Water-Supply Paper No. 270, pp. 192, pls. 5, fig. 1*).—This report contains the results of measurements of flow of water in the streams of the Great Basin, including the Wasatch Mountains, the Humboldt Sink, and the Sierra Nevada drainage areas, and the Great Basin drainage in Oregon.

Well-drilling methods, I. BOWMAN (*U. S. Geol. Survey, Water-Supply Paper No. 257, pp. 139, pls. 4, figs. 25*).—This paper is based upon ground-water investigations in the eastern United States, extending over a period of 3 years, and including actual observations on well drilling, supplemented by one season's observations in the South and Middle West. The paper contains a general account of underground waters of the United States; water, oil, and gas-bearing formations; the history of well-drilling; and the distribution of drilled wells. Different methods of well drilling are described, with a discussion of some special features of well construction and general estimates of the cost of well sinking.

Pond fertilizing, KUHNERT (*Mitt. Deut. Landw. Gesell., 25 (1910), Nos. 6, pp. 77–81; 10, pp. 151, 152; abs. in Wasser u. Abwasser, 3 (1911), No. 10, p. 426*).—The author maintains that it is profitable to use artificial fertilizers in fish culture, and recommends that Thomas slag and kainit, each at the rate of about 534.4 lbs. per acre, and sodium nitrate at the rate of 178.1 to 267.2 lbs. per acre be used on fish ponds.

Sewage sludge and its disposal, A. B. OGDEN (*Surveyor, 38 (1910), No. 983, pp. 690–694*).—This paper discusses various methods of sludge disposal, but gives particular attention to its utilization as a fertilizer.

Analyses of sludge from different sources and results of experiments are cited to show that the fertilizing value of sludge is well above that of ordinary barnyard manure. The author describes methods of handling the sludge so that it can be easily used by farmers without creating a nuisance. He urges all those who are interested in agriculture or have to deal with sewage disposal to aid in promoting the use of sewage sludge as a manure and thus restore to the land the fertilizing material which has been taken from it.

SOILS—FERTILIZERS.

Soil productivity, T. C. CHAMBERLIN (*Science, n. ser., 33 (1911), No. 841, pp. 225–227*).—This is a review of a fuller discussion of the subject of secular maintenance of soils before the Geological Club of the University of Chicago, January 9, 1911, which attempted to show that in view of the vast age of productive soils there must be some efficient natural process for their maintenance. Among the active factors in this process to which attention is called are the transporting and mixing action of wind and water, the progressive formation of soil particles from the underlying rocks, the movement of water in the soil, and the activity of micro-organisms. It is shown that although the total loss of certain soil constituents in the drainage is large, there is a tendency toward the accumulation of some of the constituents in the surface soil.

Analyses are cited to show that in the larger proportion of cases the percentage of phosphoric acid is higher in surface soils than in subsoils, but that the percentage of potash is lower. Some of the phosphatic and potash compounds are to be grouped with silica, alumina, and ferric oxid as the rock elements that tend to stay in soils, while soda, lime, and magnesia compounds are more likely to be carried away in the drainage.

It is pointed out that plant growth cooperates with capillary action in concentrating certain soil constituents in the surface soil.

The practice prevailing in certain parts of China of carefully saving and utilizing all animal and vegetable refuse and returning it to the soil is referred to as showing the possibility of maintaining a high productiveness without the use of artificial fertilizers. The author is of the opinion that by this method of treatment the fertility of the soils can be maintained until the country is base-leveled. The fact that the old soils of certain parts of Europe are more productive unit for unit than the newer soils of America is referred to as an example of the possibility of maintaining high productiveness on soils densely populated and intensively cultivated.

In general the author is of the opinion that the facts regarding soil productiveness "do not offer substantial grounds for an alarming forecast, applicable to an industrious and intelligent people willing to be guided either by oriental experience or by western scientific research."

The relation of certain nonleguminous plants to the nitrate content of soils, T. L. LYON and J. A. BIZZELL (*Jour. Franklin Inst.*, *171* (*1911*), *Nos. 1, pp. 1–16; 2, pp. 205–220, dgms. 4*).—From the investigations here reported the authors conclude that "the nitrate content of soil under timothy, corn, potatoes, oats, millet, and soy beans was different for each crop when on the same soil. There was a characteristic relationship between the crop and the nitrate content of the soil at different stages of growth. During the most active growing period of the corn crop, nitrates were higher under corn than in cultivated soil bearing no crop. Under a mixture of corn and millet, nitrates at this period were higher than under millet alone, although the crop yields were about the same on both plats.

"These phenomena may be accounted for on the assumption that nitrification is stimulated by some processes connected with the active growth and absorbing functions of plants, particularly of corn, although there are indications that the corn plant obtains a part of its nitrogen in some form other than nitrates, the combination of which conditions may account for the very high nitrate content of the soil under corn.

"Under both corn and oats, the nitrate content was higher during the period when the crop was making its greatest draft on the soil nitrogen than in the later stages of growth, in spite of the fact that the nitrates in the uncropped soil were increasing while those in the cropped soil were disappearing. Nitrates under these crops and under millet failed to increase late in the season, when nitrogen absorption had practically ceased, although uncropped soil showed a very large increase in nitrates at that time.

"This in conjunction with facts before mentioned, indicates a further influence of the crop on the process of nitrification, and may be accounted for on the supposition that the plants, during their later period of growth, exert, in some manner, a retarding influence on nitrification.

"The large differences in the nitrates under the crops mentioned may, aside from the influence of cultivation, possibly be found in the inherent differences between plants of different species in their stimulating or inhibiting influence on nitrification, as well as in their relative rates and amounts of nitrogen absorption.

"Changes in the moisture content, or in the temperature of soil under crops during the growing season, had no important effect on the nitrate content of the soil, except under the legume, soy beans. On uncropped soil an increase in moisture content in September was accompanied by a marked increase in nitrates."

Interpretations of results noted in experiments upon cereal cropping methods after soil sterilization, H. L. BOLLEY (*Science, n. ser.*, *33* (*1911*), *No. 841, pp. 229–232*).—In this paper, which was read before the American Society of Agronomy at Washington, D. C., in November, 1910, the author takes the position that the beneficial effect of soil sterilization is probably due more to destruction of disease germs than to its action on the chemical properties or bacteriological activities of the soil.

Colloid materials in clay and adsorption phenomena, P. ROHLAND (*Landw. Jahrb., 39 (1910), No. 3, pp. 369–372; abs. in Chem. Zentbl., 1910, II, No. 7, p. 491*).—The author reviews conclusions from his previous work regarding the importance and functions of colloids in the soil, and especially their bearing upon plasticity, permeability, and absorptive properties of soils. He does not accept Ehrenberg's explanation (E. S. R., 24, p. 131) of the fact that certain kinds of ions are absorbed while others are not, and he does not believe that this depends in any way upon the ease or difficulty of solution of the salts. He finds that with the exception of neutral calcium carbonate all calcium salts are more readily soluble than calcium sulphate, of which the ion SO_4 is not absorbed but diffused.

The amount of water and plant food removed from soils by drainage, M. GERLACH (*Illus. Landw. Ztg., 30 (1910), No. 95, pp. 879–881, figs. 2*).—This article briefly summarizes results of studies with lysimeters and on field drainage systems.

Examination of drainage water from fields of 5 farms showed 215 gm. of lime per cubic meter of drainage water, 6.3 gm. of potash, and 11.8 gm. of nitrogen, of which 10.9 gm. was in the forms of nitrous and nitric acids and 0.9 gm. in the form of organic nitrogen. No ammonia or phosphoric acid was found in the drainage water.

Observations on a farm drainage system during the spring of 1909 showed 1,161.6 cubic meters of drainage water per hectare, containing 6.8 kg. of total nitrogen, 5.9 kg. of nitric nitrogen, 7.6 kg. of potash, and 18.7 kg. of lime. While these amounts are small as compared with the total amounts present in the soil, they represent a relatively large proportion of the readily available plant food and would constitute in the course of years a considerable drain upon the soil fertility.

These results, as well as those of experiments with the lysimeters, show that phosphoric acid is firmly fixed in the soil and is subject to little or no loss in the drainage. The largest loss is in the case of lime. Potash is also removed in the drainage to a considerable extent. The loss of nitrogen is smaller than that of either lime or potash, and mostly in the form of nitric nitrogen.

Examinations of a number of soils show that the surface soil is as a rule richer in nitrogen and phosphoric acid than the subsoil. On the other hand, the subsoils usually contain more lime and potash than the surface soil.

Denudation and erosion in the southern Appalachian region and the Monongahela basin, L. C. GLENN (*U. S. Geol. Survey Prof. Paper No. 72, pp. 137, pls. 21, fig. 1; Press Bul. 446, folio*).—This paper records observations in parts of Pennsylvania, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Tennessee, and Alabama on "hillside and mountain side wash and wear, soil removal by gullying and soil burial by overwash, stream clogging and stream overflow. the filling of mill ponds and the wrecking of dams and bridges, and numerous other evils that are attributed by many observers, in large part, to reckless deforestation and injudicious attempts to cultivate slopes that are not adapted to agriculture. . . .

"In the course of the study it was noted that steep slopes formed of certain rocks could be safely cultivated, but that others, no steeper, composed of other, different rocks were cultivated with disastrous results. . . .

"Much of the area is not properly agricultural land and should not be cleared and forced into agricultural use, because that forcing means quick destruction both of the area itself and of the lower-lying areas on the same streamways. . . . The agricultural problem involves the selection of the areas best suited for agriculture because of fertility and character of soil and moderate slope of surface and the study of the ways in which such areas may best be handled to prevent their own destruction through erosion, as well as the destruction of other lands and property by the waste material they deposit and the floods they help to generate."

The paper also gives "an account of a study made in the basin of Monongahela River in West Virginia and Pennsylvania soon after the great flood of March, 1907, which destroyed millions of dollars' worth of property."

The preparation and use of peat as fuel, C. A. DAVIS (*U. S. Geol. Survey Bul. 442, pp. 101–132*).—It is stated that peat beds of workable extent are found widely distributed in Alaska. The character of the peat and methods of working such deposits are described. Turfy peat from a tundra at St. Michael showed a calorific value of 7,092 British thermal units per pound, comparing well in this respect with subbituminous coals and lignites. Methods of preparing the raw peat for use as fuel are described. A selected bibliography of works on peat is given.

Lawn soils, O. SCHREINER and J. J. SKINNER (*U. S. Dept. Agr., Bur. Soils Bul. 75, pp. 55, pls. 8, figs. 3*).—This bulletin, prepared largely for the guidance of park authorities in the selection of soil materials for the improvement and making of lawns, parks, embankments, and terraces, and also for the individual owner of a small tract of land in town or city, discusses "the character of soils in respect to the minerals and organic materials composing them, as well as the kind and amounts of different-sized soil particles which determine the suitability of soils for lawn making. The texture of soils as related to lawns is especially emphasized and the relation of surface soil to subsoil receives consideration in regard to its effect on lawns. The difference between land devoted to lawn culture and land growing a farm crop is pointed out and the movement of soil moisture and its dependence on texture, as well as its importance to the maintenance of a good greensward is explained.

"The presence of harmful compounds in certain soils is shown and their bearing on lawn construction and preservation is considered, as is also the influence of trees on lawns and the remedial measures to be employed.

"The soils suited for the building of lawns, parks, parked embankments, and terraces, etc., receive special consideration, and the best methods for building up artificial grounds by the hauling in of such suitable soil material, both for subsoil fillings and for surface layering, are given full consideration, a list of soil types well adapted to grass growing being given for this purpose."

Soil analyses, T. E. KEITT (*South Carolina Sta. Rpt. 1910, pp. 54–63*).—Mechanical and chemical analyses of 35 samples of soil of 4 different types on a farm near Columbia, S. C., on which fertilizer experiments are being conducted by the Bureau of Plant Industry of this Department, are reported.

The results show that on these coastal plain soils underlain by a sandy clay the phosphoric acid applied as soluble phosphate was largely retained in the first 18 in. of soil, the greater proportion being in the first 6 in. Much of the potash applied was retained in the second 6 in. of soil. The nitrogen content was highest in the first 6 in., and greatly decreased to a depth of 18 in., below which it was low and fairly constant. The content of organic matter was inversely proportional to the length of time the land had been under cultivation. In soil which had been under cultivation for a number of years the loss on ignition decreased to a depth of 18 in., beyond which there was an increase, attributed, however, to loss of water of hydration from the clay.

Western prairie soils: Their nature and composition, F. T. SHUTT (*Canada Cent. Expt. Farm Bul. 6, 2. ser., pp. 25, pls. 2, map 1*).—Data on mechanical analyses (by E. J. Russell, of Rothamsted) and on the chemical composition of typical soils of Manitoba, Saskatchewan, and Alberta are reported, and the physiography of the region, general characteristics, and agricultural value of the soils are discussed. The article emphasizes the general uniformity of these soils, their richness in plant food, more particularly in nitrogen, and their favorable physical condition, due chiefly to the large proportion of partly decomposed vegetable matter they contain.

In 8 samples of Manitoba soil examined the nitrogen varied from 0.346 to 1.005, phosphoric acid from 0.123 to 0.288, potash from 0.144 to 1.033, and lime from 1.02 to 10.57 per cent. In 12 samples of Saskatchewan soil the nitrogen varied from 0.134 to 0.572, phosphoric acid from 0.064 to 0.391, potash from 0.164 to 0.898, and lime from 0.50 to 3.51 per cent. In 9 samples of Alberta soil the nitrogen varied from 0.215 to 0.673, phosphoric acid from 0.123 to 0.240, potash from 0.250 to 0.673, and lime from 0.37 to 1.28 per cent.

Analyses of cultivated and adjacent prairie soil show that continuous grain growing for a number of years has considerably reduced the organic matter and the nitrogen. Fallowing, while useful as a means of conserving moisture and destroying weeds, is very wasteful of organic matter and nitrogen.

Analyses are reported which show that Saskatchewan soil which has been under cultivation for 22 years contains one-third less nitrogen than adjacent untouched prairie, although the crops of wheat on this soil are as good as at the beginning. The analyses indicate that twice as much nitrogen is destroyed by cultivation as is removed in crops. The soils are as a rule rich in readily soluble mineral matter and frequently become alkaline when irrigated.

Some characteristics of the western prairie soils of Canada, F. T. Shutt (*Jour. Agr. Sci., 3 (1910), No. 4, pp. 335–357, pls. 2*).—This is substantially the same article as that noted above.

Deli soils, J. G. C. Vriens and S. Tijmstra (*Meded. Deli-Proefstat. Medan, 5 (1910), No. 5, pp. 115–143, fig. 1*).—In this report of a continuation of investigations on Deli soils (E. S. R., 23, p. 224), the authors describe a new method of arranging and comparing results of analyses, and report a large number of analyses of soils of the Deli region, Sumatra, the results of which showed a relatively high nitrogen content, a poor to medium lime content, and a low phosphoric acid content. Fifty per cent of the soils were low in potash.

A study of the relations of nitrogen to phosphoric acid, potash, and lime, and of phosphoric acid to potash and lime in the soils analyzed showed that a low nitrogen content was generally associated with a low phosphoric acid content, and a high nitrogen content with a high phosphoric acid content. A high nitrogen content went with a high lime content, and a low content of nitrogen with a low content of lime. The relation of nitrogen to potash was usually the reverse of this. A low phosphoric acid content was associated with a high potash and with a low lime content, whereas a high phosphoric acid content was associated with a low potash and with a high lime content.

The chemical analysis of soils, W. P. Brooks (*Massachusetts Sta. Circ. 29, pp. 3*).—A revision of Circular 11, previously noted (E. S. R., 19, p. 818).

Manuring of heavy soils, Andre (*Ztschr. Angew. Chem., 23 (1910), No. 12, pp. 566, 567; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 8, pp. 504, 505*).—Nitrogenous manures should be used sparingly for cereals on heavy soils; an excess reduces the yield of grain. On such soils calcium cyanamid is the preferable form. Superphosphate is the best form of phosphoric acid to use. Kainit may harden the soil, but 40 per cent potash salt is beneficial, especially for clover. In case of turnips potash salts may give a disagreeable odor and taste to the milk of cows fed on the turnips, and in case of potatoes they may decrease the starch content. Lime is often needed, especially where potash salts are liberally used, and finely ground limestone may be used with advantage, especially on pasture land. In other cases quicklime is preferable, and, as a rule, when lime in this form can be bought for little more than that in carbonate.

Manure on chernozem (*Viestnik Selsk. Khoz., 1909, Nos. 49, 50, 51–52; abs. in Zhur. Opytn. (Russ. Jour. Expt. Landw.), 11 (1910), No. 3, p. 415*).—The author concludes from a critical review of data from the Kherson, Odessa, and Poltava experiment fields and from the Ploti, Shatilov, and Ivanov experiment stations, that there is no doubt of the need of chernozem soils for fertilizers. The value of manure on such soils is determined by its content of phosphoric acid and nitrogen. The value of potash on chernozem soils remains undetermined. The same is true of the indirect value of manure, but the after effect of manure is considerable, lasting usually for four years.

The mineral matter of hay and chemical fertilizers, G. PATUREL (*Jour. Agr. Prat., n. ser., 21 (1911), No. 1, pp. 12–14*).—Analyses of hay grown with different fertilizers are cited to show that the mineral matter of hay is increased to a marked extent by the use of chemical fertilizers, the increase being greatest in the case of phosphoric acid and somewhat less in the case of lime and magnesia. The maximum increase was observed when fertilizers containing phosphoric acid and potash were applied. Leguminous plants are especially susceptible to this action of fertilizers.

Peruvian guano (*Bol. Dir. Fomento [Peru], 8 (1910), No. 8, pp. 3, 4*).—Analyses of 66 samples of guano from islands off the coast of Peru are reported. In these the nitrogen varied from 1.4 to 14.84 per cent, the phosphoric acid from 4.6 to 19.45 per cent, and the potash (in 9 samples) from 1.39 to 3.9 per cent.

The relative effect of different forms of nitrogen on the yield of oats in dependence upon the character of the soil and the conditions of the experiments, N. OVCHINNIKOV (*Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 4, pp. 481–532*).—Various nitrogenous fertilizers were tested in connection with a basal fertilizer supplying potash and phosphoric acid on sandy, light loam, medium loam, and clay soils in Wagner pots, the yield and nitrogen content of the crop being determined. The yield was influenced to a marked extent by the character of the soil, the largest yield with all forms of nitrogen being obtained upon the medium loam soil, the smallest on the sandy soil.

Calcium nitrate, Norwegian nitrate, and ammonium sulphate gave higher yields than sodium nitrate on all except the sandy soils, on which the physiological acidity of the ammonium sulphate seemed to produce unfavorable results. The three substances first named produced almost the same results, but the nitrogen of ammonium sulphate was assimilated to a larger extent than that of the calcium nitrate or the Norwegian nitrate. The coefficient of nitrogen assimilation was higher for calcium nitrate, Norwegian nitrate, and ammonium sulphate than for sodium nitrate.

Of the organic nitrogenous fertilizers tested steamed bone meal was most readily assimilated, its coefficient of assimilation on a medium loam soil being higher than that of sodium nitrate. The assimilation of calcium cyanamid was much lower than that of sodium nitrate. The nitrogen of blood meal was 85 per cent as assimilable as that of sodium nitrate on medium loam soil and 63 per cent as assimilable on loam soil. The lowest coefficient of assimilation was shown by meat meal and raw bone meal, which were almost unutilized on sandy soils.

Calcium cyanamid increased the yield of grain more than that of straw, the organic nitrogenous fertilizers showing as a rule the same tendency. The increase of grain as compared with straw was greatest on the light loam soil.

The percentage of nitrogen in the crop was greater with the mineral sources of nitrogen (including lime nitrogen) than with the organic sources.

The utilization of the nitrogen of the air by means of the electric flame, J. Zenneck (*Phys. Ztschr., 11 (1910), No. 26, pp. 1228–1233, pls. 4; Naturw. Rundschau, 26 (1911), Nos. 6, pp. 69–71, figs. 4; 7, pp. 81–83, figs. 2; abs. in Metallurg., and Chem. Engin., 9 (1911), No. 2, pp. 73–75, figs. 7; Chem. Ztg., 34 (1910), No. 114, p. 1014*).—This is a paper presented at the meeting of the German Naturalists and Physicians in Königsberg, describing various forms of electric furnaces which have been used in the manufacture of nitrogen compounds from the air.

Zeolitic potash fertilizers, T. Remy (*Mitt. Deut. Landw. Gesell., 25 (1910), No. 52, pp. 777–779, figs. 3*).—The author reports data indicating a higher efficiency of lime trass fertilizer as a source of potash for potatoes than Stutzer found for peas and barley (E. S. R., 24, p. 134). The material used in these experiments contained water-soluble potash 7.63 per cent and total potash 9.34 per cent. Stutzer experimented with a material containing only 2.41 per cent of difficultly soluble potash.

Zeolitic potash fertilizers, A. Stutzer (*Mitt. Deut. Landw. Gesell., 26 (1911), No. 2, p. 21*).—The author suggests that the better results obtained by Remy (noted above) were due to the added potash salts in the reinforced trass fertilizer used in his later experiments.

Increased German production of potash, F. D. Hill (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 21, p. 329*).—Statistics are given which show that under the new apportionment the amount of potash which may be produced during the period from May 1 to December 31, 1911, is 219,780 metric tons of pure potash (K_2O) for home consumption and 282,590 tons for exportation, an increase of about 100,000 tons over the previous apportionment.

A review of the phosphate fields of Florida, W. H. Waggaman (*U. S. Dept. Agr., Bur. Soils Bul. 76, pp. 23*).—This bulletin reports work in cooperation with the U. S. Geological Survey. The results of the inquiry are summarized as follows:

"There are two commercially important classes of phosphate rock in Florida—the hard-rock phosphate and the land-pebble phosphate.

"The hard-rock phosphate fields extend north and south along the west coast of the peninsula for a distance of 100 miles. The present land-pebble phosphate regions lie south of the hard-rock fields, in Polk and Hillsboro counties.

"Both the hard-rock and pebble deposits of phosphate belong to the Tertiary period. The methods of mining these two classes of phosphate rock differ considerably. In the hard-rock workings the material is either dug out or dredged. In the pebble deposits hydraulic mining is employed.

"Practically all the hard-rock phosphate is shipped abroad and sold on a guaranty of 77 per cent tricalcium phosphate. The pebble phosphate is used both in this country and abroad, being sold on guaranties ranging from 60 to 75 per cent tricalcium phosphate.

"In order to remove the impurities the material which comes from the mines is put through a washing process, during which much valuable phosphate is washed away. It is estimated that the actual amount of phosphoric acid lost in preparing the rock for the market is nearly twice as great as the quantity saved.

"Possible means of utilizing this waste material are suggested, namely, to apply it to muck soils deficient in phosphoric minerals or to extract the phosphoric acid from it by means of a cheap solvent.

"The average cost of preparing hard-rock phosphate for the market is not less than $3.50 per ton, while the finished pebble product costs about $2 per ton.

"Early in 1910 there were 20 companies operating in the hard-rock regions, with a total annual capacity of more than 750,000 tons.

"In the pebble regions 15 companies were engaged in mining operations, with a capacity of 1,500,000 tons per annum.

"Owing to various causes the hard-rock industry was at a rather low ebb during 1909 and 1910, many plants being entirely closed down, but the operators expect the situation to improve.

"The pebble industry, however, has been growing uninterruptedly and promises to continue to increase.

"The life of the hard-rock phosphate is variously estimated to be from 20 to 100 years: the deposits of land-pebble phosphate are considered almost inexhaustible."

On the alleged refutation of the lime factor theory, II, O. LOEW (*Landw. Jahrb., 39 (1910), No. 6, pp. 1005–1009*).—The author again takes issue with the conclusions of D. Meyer (E. S. R., 24, p. 134), and questions the reliability of his results on the ground that the plants, which were harvested at the blooming stage, should have been allowed to mature, and further that too many plants were grown in each pot to secure normal development. The author restates fully his own conclusions with reference to the lime factor in soils and refers to the work of a number of other investigators which confirms his conclusions.

Increasing the yield by fertilizing with carbon dioxid, P. WAGNER (*Mitt. Deut. Landw. Gesell., 25 (1910), No. 12, pp. 176–179; abs. in Zentbl. Agr. Chem., 39 (1910), No. 11, pp. 726–729*).—This is an account of pot experiments with potatoes to investigate the theory of Krantz that the growth of plants is increased by using fertilizers which produce a large amount of carbon dioxid and heavily charge the air surrounding the plants.

Comparative tests were made of two of the fertilizing materials proposed by Krantz for this purpose, and of guano, green manure (vetch), and ordinary stable manure, as well as nitrate of soda. The results showed that there was no definite relation between the amount of carbon in the different manures and the yield produced, but that the yields depended upon the amount of easily assimilated nitrogen furnished by the manures.

Plat experiments with fertilizers, J. H. STEWART and H. ATWOOD (*West Virginia Sta. Bul. 131, pp. 207–242, pls. 18*).—This bulletin gives the results to date of experiments partly reported upon in previous bulletins of the station (E. S. R., 19, p. 1019), summarizing the results of the whole investigation from 1900 to 1910.

The succession of crops during this period has been rye, wheat, clover, corn, cowpeas, corn, potatoes, rye, and hay (2 years). The results show that the most deficient fertilizing constituent in this soil is phosphoric acid, and that this must be supplied before either nitrogen or potash can be of any particular value. Next to phosphoric acid, nitrogen is the most deficient constituent except in case of potatoes, which were more benefited by applications of potash than of nitrogen. The results with lime were inconclusive, there being a reduction of yield when this material was first applied, but an increase in later years. Corn responded more favorably to stable manure than to commercial fertilizers, while with cowpeas the reverse was true. The great importance of carefully saving and using manure was clearly demonstrated in these experiments. It is also shown that when commercial fertilizers alone are used these should contain all three fertilizing constituents, but the proportion of phosphoric acid should be especially high.

Inspection and analyses of commercial fertilizers, W. F. HAND ET AL. (*Mississippi Sta. Circ. 32, pp. 35*).—This is the first of a proposed series of three circulars giving analyses and valuations of fertilizers inspected during the season of 1910–11. The circular emphasizes the folly of buying fertilizers wholly on the basis of price per ton and of using low-grade fertilizers.

Commercial fertilizers, N. W. LORD and C. E. THORNE (*Ann. Rpt. Ohio Bd. Agr., 64 (1909), pp. 321–412*).—Analyses and valuations of fertilizers inspected during 1909 are reported, with the text and a summary of the state fertilizer law, a brief discussion on the use of fertilizers, and an explanation of their valuation.

AGRICULTURAL BOTANY.

A text-book of general bacteriology, E. O. JORDAN (*Philadelphia and London, 1910, 2. ed., rev., pp. 594+16, figs. 162, chart 1, map 1*).—This is a second edition of this book (E. S. R., 20, p. 827), in which the author has added several new sections, including discussions of iron and sulphur bacteria, the relations of bacteria to the higher forms of life, concentration of diphtheria antitoxin, fermentation of sauerkraut, bakery fermentation, retting of flax and hemp, bacterial destruction of cellulose, and epidemic infantile paralysis.

A review of microbiological agriculture, E. KAYSER (*Bul. Mens. Off. Renseig. Agr. [Paris], 9 (1910), No. 11, pp. 1274–1281*).—Recent works on industrial fermentation (alcoholic, etc.), milk, butter, cheese, and fermentation products of milk are reviewed.

On bacteriological soil investigation methods, T. REMY and G. RÖSING (*Centbl. Bakt. [etc.], 2. Abt., 29 (1911), No. 1–3, pp. 36–77*).—The authors give the results of experiments on the influence that the chemical elements and physical properties of the inoculating soils have on peptone decomposition, and the possibility of using the peptone-decomposing power of a soil as a measure of its ability to decompose other complex nitrogenous compounds.

The movements of nitrogen in the soils in the vicinity of Rome, R. PEROTTI (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 19 (1910), II, No. 12, pp. 671–678*).—As a result of investigations and experiments with various soils with reference to their nitrogen content, the author claims that the fertility of soils is dependent upon their ammonification, nitrification, denitrification, and nitrogen-fixation ability, as determined by the soil micro-organisms present.

Relation of certain fungi to nitrogen fixation, B. M. DUGGAR and L. KNUDSON (*Science, n. ser., 33 (1911), No. 840, p. 191*).—The authors report the results of two series of experiments involving about 400 flask cultures, in which the following fungi were used: *Coprinus comatus, Dædalia quercina, Polyporus sulphureus, Trichoderma lignicola*, and *Aspergillus niger*. Nine different kinds of culture media were employed.

The nitrogen determinations indicate that no fixation of free nitrogen occurred, except possibly in certain cultures of *A. niger*. On the contrary, in many cases there was a loss of nitrogen.

Torula bogoriensis rubra, a new nitrogen-fixing yeast, E. DE KRUIJFF (*Ann. Jard. Bot. Buitenzorg, 1910, Sup. 3, pt. 1, pp. 93–96; abs. in Bot. Centbl., 114 (1910), No. 19, p. 489*).—A description is given of this yeast, which was obtained by inoculating a solution of mannite with garden soil. The author claims that it is able to fix free nitrogen and to produce amylase and lipase, but is unable to ferment glucose, saccharose, maltose, and galactose, or to form alcohol.

Influence of the mineral constituents of nutritive solutions on the development of Azotobacter, HELENE KRZEMIENIEWSKA (*Bul. Internat. Acad. Sci. Cracovie, Cl. Sci. Math. et Nat., Ser. B, 1910, pp. 376–413; abs. in Jour. Chem.*

Soc. [*London*], *98* (*1910*), *No. 577, II, p. 987*).—It was found that potassium, calcium, magnesium, phosphorus, and sulphur were all essential to the development of Azotobacter. A deficiency in any of these mineral elements of the nutritive solution resulted in a less economical utilization of the dextrose and a consequent decrease in the amount of nitrogen fixed per gram of dextrose. The addition of potassium, sodium, and magnesium compounds above certain limits was found to act injuriously on the Azotobacter.

The influence of the culture media on the formation of diastase by molds, K. SAITO (*Wchnschr. Brau., 27* (*1910*), *No. 16, pp. 181–183; abs. in Bot. Centbl., 114* (*1910*), *No. 24, pp. 618, 619*).—The results are given of experiments on the formation of diastase by *Aspergillus oryzæ* when grown on different nutritive media.

It was found that the source of the nitrogen supply had great influence on the amount of diastase formed. Nutritive media with organic nitrogen compounds, such as peptone, tyrosin, leucin, etc., gave good results, but this was not the case when inorganic acids, such as ammonium chlorid, ammonium sulphate, ammonium nitrate, etc., were used. The source of the carbon supply had no appreciable influence on the formation of the diastase by the mold.

The translocation of carbohydrates in plants, S. MANGHAM (*Sci. Prog. Twentieth Cent., 5* (*1910*), *No. 18, pp. 256–285, figs. 16; 5* (*1911*), *No. 19, pp. 457–479, figs. 3*).—The author gives a summary of literature relative to the path of the translocation current and describes his experiments on the translocation of sugars.

From a histological and anatomical study he concludes that sugars pass from the chlorophyll tissues of the leaf into the bundle sheaths of the finer veins and are thence removed by the sieve tubes. Physiological experiments seem to confirm this conclusion.

The author reports that the use of Fehling's solution in his investigations was unsatisfactory as a test, and he recommends the method introduced by Senft, by which osazones of the sugars are formed. These are said to be easily seen and are permanent in glycerin. The sieve tubes were frequently conspicuous on account of the bright yellow osazones when none were to be found in the surrounding parenchyma.

Work is in progress with some of the lower plants to determine how far the sieve tubes serve to conduct carbohydrates.

A bibliography on the translocation of carbohydrates is appended.

Rôle of reduction processes in the respiration of plants, W. ZALESKI (*Ber. Deut. Bot. Gesell., 28* (*1910*), *No. 7, pp. 319–329; abs. in Jour. Chem. Soc.* [*London*], *98* (*1910*), *No. 577, II, p. 990*).—According to investigations of the author the reducing power of various seeds, as indicated by methylene blue, was found to be greatest in peas and least in cereals and oil-bearing seeds, while wheat and lupines occupied an intermediate position. There is claimed to be a certain parallelism between the anaerobiose and the reducing power of seeds, since anaerobiose is highest in leguminous seeds and lowest in cereal and oil seeds.

Acid salts were found to depress the reducing power of peas. Neutral salts and sodium selenite acted still more unfavorably, while alkalis, especially the dibasic phosphates, stimulated the reduction process.

The relation between chlorophyll and photosynthetic energy, W. N. LUBIMENKO (*Trudy Imp. S. Peterb. Obshch. Estestvo.* (*Trav. Soc. Imp. Nat. St. Petersb.*), *41* (*1910*), *III, No. 1–2, pp. 266, figs. 9*).—The author has sought to establish the relation between the amount of chlorophyll and the photosynthetic energy of plants.

It was found that photosynthesis begins as soon as the minimum of light absorption has been attained, provided there is already present a minimum of chlorophyll. The minimum of light required for photosynthesis varies, the greater the amount of chlorophyll the less being the light requirement. The energy of photosynthesis is said to increase with the amount of chlorophyll up to a maximum, which is attained only in young leaves, older ones accumulating an amount of chlorophyll in excess of their absorbing power in bright light. Too strong light causes a diminution in the energy of photosynthesis, the decrease being more rapid as the chlorophyll content and the external temperature increase. The maximum of photosynthesis coincides with an optimum of illumination, but the light optimum decreases with an increase in chlorophyll. No direct relation was found between the temperature and chlorophyll content as affecting photosynthesis. The specific energy of photosynthesis in various species of plants is not directly influenced by the amount of chlorophyll present, although too great a proportion of the pigment diminishes the activity of the chlorophyll tissues of the plant.

In a series of experiments to determine the production of dry matter and chlorophyll in plants under different degrees of illumination, it was found that the decomposition of carbon dioxid attained its maximum under red light and its minimum under green light. On the other hand, the production of dry matter was at its minimum under the red light and its maximum under blue and violet radiations. The production of dry matter under the red and yellow light was less than the maximum energy of carbon dioxid decomposition under these illuminations. This apparently indicates two stages in photosynthesis, the first of which is characterized by the carbon dioxid decomposition and liberation of oxygen, and the second in which there are photochemical reactions connected with the transportation and utilization of elaborated material. It is probable that the chlorophyll grain assists in the second stage and that the more refrangible rays of light furnish the energy in this case.

The production of dry matter under white light increases with the illumination and the decomposition of carbon dioxid up to a maximum, after which it falls, although the carbon dioxid decomposition may still increase. This indicates that the optimum of light for the production of dry matter in plants is lower than that for the decomposition of carbon dioxid. An excess of light absorbed by a leaf diminishes its production of dry matter. The unfavorable influence of too great illumination is probably due to a retarding action of the transportation and utilization of the organic materials elaborated by the chlorophyll tissues.

The production of chlorophyll in a plant is regulated by the character of its illumination. It increases with the light up to a maximum, after which it diminishes as the light increases. The maximum production of dry matter is attained under an illumination that becomes more feeble as the chlorophyll content is increased. With a given plant the maximum dry weight is produced under different degrees of light intensity, depending on the chlorophyll content of the chloroleucites. A plant is able within certain limits to adapt itself to light by increasing or reducing the amount of chlorophyll to correspond to the strength of the light. This adaptation can not be effected except during the development of the leaves.

Two physiological types may be recognized among plants, those which produce little chlorophyll and have a high light requirement, and those which form large quantities of chlorophyll and as a result are able to grow in comparatively feeble illumination. Plants require for the maximum production of dry matter less light at a high temperature than at a lower one, light and temperature within certain limits replacing one another. Photosynthesis is a physiological function in the nutrition of the green plant which is regulated by the plant itself. Plants utilize chlorophyll as a sensibilizer by which they adapt their chlorophyll apparatus to the environment in which they grow.

An extended bibliography is appended to the article.

The action of light on chlorophyll, P. A. DANGEARD (*Compt. Rend. Acad. Sci.* [*Paris*], *151* (*1910*), *No. 26, pp. 1386–1388*).—Attention is called to the effect of light upon an alcoholic solution of chlorophyll. By means of a simple contrivance the author was able to expose the solution to a pure spectrum for a period of 8 days, and the decoloration took place immediately in that part of the spectrum which corresponds to the principal absorption band of chlorophyll, followed later by bleaching in the neighboring regions which correspond to the other absorption bands. The chlorophyll was not decolored in the other portions of the spectrum, although it remained for 8 days subject to the effect of light.

The action of different colored light on plants, C. FLAMMARION (*Bul. Mens. Off. Renseig. Agr.* [*Paris*], *9* (*1910*), *No. 11, pp. 1261–1264*).—In continuation of investigations begun by the author in 1894, a report is given on the observations carried on during the past 2 years on the effect of different colored light on the translocation of albuminoids (E. S. R., 22, p. 529). The first year's results, in which it appeared that a greater increase in nitrogen took place under the colored than under the clear glass and that this increase was greater under those colors which least stimulated chlorophyll production, have been confirmed by subsequent investigations.

In connection with these studies some observations were made upon chrysanthemums in which plants grown under different colored screens were found to behave very differently in relation to the size, form, and color of their flowers.

Experiments on the fall and renewal of leaves, C. FLAMMARION (*Bul. Mens. Off. Renseig. Agr.* [*Paris*], *9* (*1910*), *No. 11, pp. 1272–1273*).—In experiments begun in 1891, the author by means of different colored screens has undertaken to influence the fall and renewal of leaves of one of the common oaks. The plants were grown in pots, and by means of protection from freezing he has been successful in developing a form of the oak which does not lose its leaves in autumn, the new leaves being put out prior to the fall of the old ones. The persistence of the leaves is especially noted under certain illuminations.

Influence of temperature on the phenomena of growth, J. LOISEL (*Bul. Mens. Off. Renseig. Agr.* [*Paris*], *9* (*1910*), *No. 11, pp. 1267–1272*).—The author reviews some of the theories relative to the temperature requirements of plants and presents data on the period of leafing and flowering of a number of species preliminary to an extended study of the relation between temperature duration and phases of development of plants.

The induced maturity of seeds, P. MAZÉ (*Compt. Rend. Acad. Sci.* [*Paris*], *151* (*1910*), *No. 26, pp. 1383–1386*).—The author states that seeds of maize or peas taken from the ear or from the pod at a time when they contain from 50 to 60 per cent of water will not germinate under conditions favorable to plant growth, but that if dried in the air for several days they will germinate and give rise to normal plants.

In considering the reason for this, 3 theories are propounded, (1) that there is an oxidation of material in the seed which is capable of maintaining the embryo in a latent stage, (2) that a chemical condensation takes place which modifies the composition of the cell sap, and (3) that there is an evaporation of the volatile material in the seed that would tend to retard the growth of the embryo. The third theory is considered the most possible one, and the author shows that seeds which contain a considerable proportion of ethyl aldehyde in the fresh state lose this upon drying, and further that dry seeds placed in a dilute solution of alcohol will not germinate except as certain molds are present which destroy the alcohol and thus assist in stimulating the development of the embryo.

The nature and uses of hard seeds, BERTHA REES (*Jour. Dept. Agr. Victoria, 8 (1910), No. 12, pp. 770–773, pl. 1*).—Attention is called to the fact that many leguminous plants have seeds which on account of their slow germination are designated as hard seeds, and that these plants have a tendency to produce a higher percentage of hard seeds when grown in a dry climate than in a moist one. The author discusses the various theories relating to the nongermination of these seeds and describes the experiments of Jean White (E. S. R., 20, p. 629) in which it was found that seeds have an impermeable membrane consisting of a cuticularized layer that prevents the entrance of water.

The author has examined the seeds of a considerable number of leguminous and other plants, and found that with the exception of canna there was a well-defined cuticle outside the palisade cells. This cuticular layer is believed to be formed by the laying down of waxy or fatty substance in the cell wall and to consist of the original cell wall permeated through and through with particles of wax. The action of abrasion, hot water, and chemicals upon this layer is described.

On the retention of mineral matter taken up by annual plants during growth, G. ANDRE (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 26, pp. 1378–1382*).—The author has made a study of beans, white lupines, and pinks from the beginning of their growth to maturity, and finds that they retain practically all the mineral materials taken from the soil.

The data for the pinks are given in detail. The plants were analyzed at 5 periods of growth, the nitrogen, phosphoric acid, lime, magnesia, and potash being determined. There was found to be a constant increase in the fresh weight of the plants up to the flowering period, after which there was a loss. The dry matter and ash, however, continued to increase until after maturity, when the leaves had become completely dry. An examination of the ash and nitrogen showed a steady increase up to the period of fruiting, when the magnesia became constant and there was a slight falling off in the proportion of phosphoric acid. In the case of the phosphoric acid it is thought that the plants did not take any of this substance from the soil after the setting of the seed and that the loss represents the amount required for their development. The increase in lime and potash is said to indicate that the plant continues to take mineral materials from the soil throughout all stages of development.

The increased tolerance of maize to boron, H. AGULHON (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 26, pp. 1382, 1383*).—In a previous publication (E. S. R., 23, p. 230) the author has shown the optimum amount of boron which plants will endure. Subsequent investigations carried on with maize indicate that plants may accustom themselves to still greater quantities of boron and that this increased resistance is transmitted. In his experiments the progeny of the second generation of maize was able to withstand quantities of boron that were toxic to check plants.

Observations on the biology and pathology of sterility in the olive, L. PETRI (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat e Nat., 5. ser., 19 (1910), II, No. 12, pp. 668–671*).—In a general discussion of the probable causes for the shedding of immature olive fruits, the author suggests that the lack of an adequate supply of water during the formation of the sexual organs of the olive flowers is probably one of the principal causes of a large percentage of aborted ovaries.

The proportions of lime to magnesia in the soil, and their relation to nutrition in citrus trees, R. R. SNOWDEN (*Proc. Fruit Growers' Conv. Cal., 37 (1910), pp. 76–82*).—The author claims to have traced several cases of malnutrition, and specifically of incipient chlorosis or "mottled leaf" in orange and lemon trees, to an excessive proportion of magnesia to the lime in the soil. A chemical examination of the ash from diseased lemon tree leaves showed a potash content 2.5 times that in healthy leaves and a phosphoric acid content 11.5 times as much, while the lime showed a decided decline due, apparently, to an excess of the magnesia in the soil compared to the lime available.

The more rapid depletion of lime than magnesia by the processes of nutrition apparently explains the fact that many citrus trees after flourishing for a time ultimately show the effects of this relative exhaustion of lime. It is believed that the addition of lime to such soils would prove profitable.

The effect of cement dust on citrus trees, S. B. PARISH (*Plant World, 13 (1910), No. 12, pp. 288–291*).—The author describes the condition of citrus trees in the vicinity of cement works not far from San Bernardino, Cal. The dust from these works is said to be detected at a distance of 3 miles, but its seriously injurious effects are limited to a radius of about 1 mile.

Investigations by means of glass plates coated with vaseline indicated that the annual deposit of dust per acre in the orchards near the mills amounted to from 2.39 to 3.18 tons. A microscopic examination showed that the dust was deposited on the upper surfaces of the leaves and that the stomata were not clogged, and there was consequently no evidence of interference with respiration or transpiration. The cement covering of the leaves, however, by absorbing dew forms a hard, opaque coating on the leaves, and this doubtless greatly reduces their assimilating power. Where observations were made of deciduous trees but slight injury was noted in comparison with citrus trees.

Some data are given relative to the apparent effect of the establishment of these cement works on the indigenous flora, a considerable number of plants which formerly were abundant having almost entirely disappeared.

An effect of cement dust on orange trees, G. J. PIERCE (*Plant World, 13 (1910), No. 12, pp. 283–288*).—The author describes his observations on the effect of cement dust on orange trees in southern California, the presence of a coating of cement deposited from cement works on the orange leaves resulting in the reduction of starch in the mesophyll cells to a very considerable extent.

The observations confirm those previously noted (E. S. R., 22, p. 29) as to the possible injury, and the author states that the more or less permanent coating of leaves which persist for 2 or 3 years, or possibly longer, with an opaque crust, will produce a much greater and more continuous effect than a covering on annual leaves, as described in the previous publication.

Natural vegetation as an indicator of the capabilities of land for crop production in the Great Plains area, H. L. SHANTZ (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 201, pp. 100, pls. 6, figs. 23*).—A study was made of the natural vegetation of the Great Plains area to determine whether it would form a basis for a proper classification of the land for crop production. It is believed that the character of the natural plant cover can be used as a reliable indicator of the conditions favorable or unfavorable for crop production, provided the relations between the vegetation and the environment are correctly interpreted.

On the Great Plains a pure short-grass cover indicates a condition of considerable run-off and of limited water penetration, the presence of the short grass being due to a growing season that is shortened by the limitation of the water supply. Wire-grass land is characterized by a deeper penetration of the rainfall because of the lighter texture of the soil. On wire-grass land during favorable years the crop production is almost as good as on short-grass land, and during dry years much better crops are produced on wire-grass land than on the other type. On bunch-grass land the soil texture is such as to insure the penetration of practically all the water that falls. Crop growth on this land is much less luxuriant than on the short-grass land when the latter is well supplied with moisture, but in the ordinary season crops on bunch-grass land seldom suffer from drought, having a larger storage reservoir to draw upon.

In general, crop failures are said to occur oftenest on short-grass land and least often on bunch-grass land, but from the visible characters of the soil settlers are disposed to select the short-grass land, leaving the bunch-grass land for later occupancy.

The economic significance of natural cross-fertilization in India, A. Howard, Gabrielle L. C. Howard, and A. Rahman (*Mem. Dept. Agr. India, Bot. Ser., 3 (1910), No. 6, pp. 281–330, pls. 13*).—The authors record observations on the natural crossing of a number of prominent Indian plants and discuss the significance of naturally produced hybrids on the improvement of crops.

In every case individual plants were grown, and at least 5 distinct natural crosses of wheat and several of peas, both of *Pisum arvense* and *P. sativum*, vetches, and beans were found, but none of barley, lentils, chick-peas, or crotalaria. All of these plants are supposed to be close fertilized and natural crossing is believed to be quite rare. Of the crops which have open flowers, such as tobacco, Ambari hemp, flax, sesame, cotton, and poppy, natural crosses were found to be quite common. Of the monœcious and diœcious plants investigated natural crossing is said to be very frequent; in fact, it is difficult to prevent.

The bearing that natural crosses have on plant breeding and on the introduction of plants in any new locality is discussed, and the authors advise the study of aberent forms, many of which are liable to be Mendelian combinations. Attention is also called to the necessity of protecting plants from foreign pollen in breeding experiments.

Notes on the cultivation of an edible mushroom, L. Matruchot (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 26, pp. 1376–1378, fig. 1*).—The author describes a method by which he has secured pure fruiting cultures of *Pleurotus cornucopioides*.

Seeds and plants imported during the period from October 1 to December 31, 1909.—Inventory No. 21 (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 205, pp. 54*).—This is an inventory of about 400 miscellaneous introductions by the Foreign Seed and Plant Introductions.

FIELD CROPS.

Growing crops in western Nebraska, W. P. Snyder and W. W. Burr (*Nebraska Sta. Bul. 118, pp. 5–69, figs. 17*).—A revision of Bulletin 109 (E. S. R., 21, p. 129), including results for 1909 and 1910.

In 1909 winter wheat on bench land ranged in yield from 22.8 bu. per acre when sown September 30 to 42.8 bu. when sown September 14. During the period 1907–1910 "summer tilled land produced 6 bu. per acre more than twice that produced on the land not summer tilled," but seed is required for only one crop in two years in case of alternate summer tillage.

Plats receiving thin seeding stooled sufficiently to make up for any deficiency in the amount of seed when seed bed and soil moisture conditions were favorable. The principal results of tests of various rates of seeding are shown in the following table:

Yields secured with the more successful rates of seeding.

Grain.	Rates tested.	Optimum rate.	Period.	Average yield.
	Pecks.	*Pecks.*		*Bushels.*
Winter wheat	2, 3, 4, and 5	5	1906-1910	47.2
Do	2, 3, 4, and 5	5	1907-1910	49.0
Spring wheat	2, 4, and 5	5	1907-1910	21.6
Oats	2, 4, 6, and 8	6	1907-1910	47.4
Common barley	2, 4, 6, and 8	6	1907-1910	24.4
Hull-less barley	2, 4, and 6	4	1907-1910	12.8
Emmer	2, 4, 6, and 8	6	1906-1909	38.1

In 1909 winter wheat on sod land yielded 40.5 bu. per acre when seeded October 22 as compared with 36.8 bu. when seeded September 21. On summer tilled land it yielded 40.9 bu. when seeded September 14 as compared with 22.8 bu. when seeded September 30. In 1910 on summer tilled land the yield following sowing September 15 was from 5 to 22 bu. higher than that following seeding on earlier or later dates. Spring wheat sown April 1 produced higher yields than when sown at any later date in 1909, and that sown March 17 excelled later seedings in 1910. The higher yields secured in variety tests are indicated in the following table:

The higher yields obtained in variety tests.

Kind of grain.	Variety.	No. of varieties in test.	Period.	Average yield.
				Bushels.
Winter wheat	Turkey red	15	1906-1910	46.75
Do	Kharkov	15	1906-1910	48.33
Spring wheat	Kahla	9	1909	33.6
Do	Velvet chaff	9	1909	31.3
Do	No. 2089, durum	10	1910	8.0
Do	Velvet chaff	10	1910	4.6
Oats	Kherson	14	1904-1910	37.5
Barley	Common	6	1909-1910	14.4

"The average results of the 3 seasons . . . indicate that drilling increased the yield of spring wheat 7.4 bu. per acre, of barley 7.7 bu. per acre, of oats 10.7 bu. per acre, and of emmer 10.8 bu. per acre." The results of other tests of methods are indicated in the following table:

Effect of various treatments on yield.

Grain.	Treatment.	Period.	Average yield.
			Bushels.
Spring wheat	Spring plowed wheat stubble	1907-1910	19.3
Do	Fall plowed wheat stubble	1907-1910	18.8
Do	Disked corn stubble	1907-1910	18.1
Do	Alternate summer tillage	1907-1910	27.1
Oats	Spring plowed oat stubble	1907-1910	27.0
Do	Disked corn stubble	1907-1910	29.6
Do	Fall plowed oat stubble	1907-1910	35.1
Do	Alternate summer tillage	1907-1910	45.5
Corn	After corn on spring plowing	1907-1910	26.3
Do	After corn on fall plowing	1907-1910	22.5

Effect of various treatments on yield—Continued.

Grain.	Treatment.	Period.	Average yield.
			Bushels.
Corn	After spring grain on spring plowing	1907–1910	18.6
Do	After spring grain on fall plowing	1907–1910	18.7
Do	Alternating with summer tillage	1907–1910	25.8
Barley	Spring plowed barley stubble	1907–1910	23.5
Do	Disked corn land	1907–1910	21.2
Do	Fall plowed barley stubble	1907–1910	26.6
Do	Alternate summer tillage	1907–1910	39.1
Kherson oats	Drilled on disked corn stubble	1907–1910	38.6
Common barley	do	1907–1910	35.3
Hull-less barley	do	1907–1910	18.4
Emmer	do	1907–1910	34.9
Durum wheat	do	1907–1910	23.4

During the period 1906–1910 listed corn excelled surface-planted corn in yield by from 6 to 8.5 bu. per acre except in 1909 when the poor stand of listed corn made its yield 9.1 bu. per acre lower than the surface-planted crop. Sorghum sown broadcast with the press drill averaged 4.77 tons of forage per acre during 1905–1910.

Alfalfa seeded in 1902 gave an annual yield in 1908, 1909, and 1910 of about 2.5 tons per acre each year. A field which had never been pastured yielded 2.79 tons per acre in 1910, that pastured by hogs yielded 2.59 tons, and that pastured by horses 2.63 tons. In a test of alfalfa seed grown in 19 different environments in various countries, Nebraska-grown seed produced the largest yield.

A table states the water content in the 6 successive ft. of soil beneath the surface at seeding and harvest time on plats of summer-tilled oats, corn, and wheat in 1908, 1909, and 1910. At each seeding time the soil contained approximately all the water it would retain. At harvest time the oat field had lost the moisture from the first 4 ft. and that in the lower 2 ft. had not been much reduced. The same effect was noted in corn fields but less clearly, while in the winter wheat field "the moisture content of the first 6 ft. was reduced to the point where plants could not take much more."

A map, charts, and tables present meteorological data.

[Alfalfa, clover, small grain, potato, and rotation tests in North Dakota], L. R. Waldron (*North Dakota Sta., Rpt. Dickinson Substa. 1910, pp. 8–42, 45–60, 76–78, figs. 12, charts 3*).—A progress report is given of tests of different rates of sowing alfalfa in drills for seed production. A continuation of work on the hardiness of alfalfa already summarized (E. S. R., 23, p. 727) indicates that during the severe winter of 1908–9 the average killing of the surviving strains was 72.7 per cent. During 1909–10 the killing of the same strains amounted to 39.4 per cent, and that of 2 strains of Grimm alfalfa to 3.1 and 1.6 per cent respectively.

Progress reports are given of a test of the effect of continued self-pollination of alfalfa, of crosses between *Medicago falcata* and *M. sativa*, and of unsuccessful attempts to cross *M. ruthenica* and sweet clover with ordinary alfalfa. Sickle lucern (*M. falcata*) tested in rows yielded 1,862 lbs. of hay per acre and produced roots 8 ft. or more long, which the author regards as indicative of drought resistance. A nearby Grimm plat on better soil yielded 2,855 lbs. of hay at the first cutting. The author finds that sickle lucern (*M. falcata*) produces but one hay crop per season, and that the seed shatters badly and contains a large percentage of hard seed which must be scratched by special machines to produce germination. He regards *M. ruthenica* as devoid of promise under conditions at the station. Clover seeded in 1909 produced during

June, 1910, yields ranging from 1,781 to 2,840 lbs. of cured hay per acre. The seed which originally came from South Dakota produced higher yields than that from Ohio, England, Russia, or Switzerland.

In a test of pollination of clover 9 per cent of the heads of the carefully screened control plat produced seed, as compared with 53.6 per cent under field conditions, 2.4 of those with which butterflies and moths were screened in, and 45.7 per cent in the enclosure in which bumblebees were placed. During 1908–1910 the 3-year average yields of timothy, slender wheat grass, and brome grass were 1,856, 2,267, and 2,149 lbs. per acre respectively. In the same test tall meadow oat grass winterkilled and *Bromus erectus* failed to start.

No. 487, the highest yielding durum, produced 24.4 bu. per acre but was a poor milling wheat. Ghirka, No. 1517, produced 27.3 bu. but gave a low yield in 1909. It appears remarkable in drought resistance but very subject to the diseases prevalent in moist years.

Turkey Red winter wheat sown on summer fallow or rich sandy loam yielded 19 bu. per acre when sown on September 3, as compared with 18.2 bu. sown on the same date on undisked barley stubble. Sowing on fallow August 5 and September 13 resulted in yields of 4.6 and 23 bu. per acre respectively.

Observations of wheat protection by drifted snow indicate that "after the cold wave the least injured plants were at the point of greatest snow depth, and the more injured ones were disposed in concentric circles around this point. At the edge of the snow drift the plants would be nearly or quite dead." On one plat gullies were formed by washing rain. "The live wheat of this plat grew in gullies from 1 to 2 in. deep." The author regards this as due to the fact that the melting snow washed away soil from the roots of wheat in this gully, resulting in aeration. During the period 1906–1910 durum, Fife and Blue Stem wheats averaged 26, 23.9, and 20 bu. per acre respectively. The comparative drought resistance is expressed by the 5-year average ratio of durum to Fife and Blue Stem of 1:1.17.

Among oat varieties Kherson, Sixty Day, and Early Mountain produced the highest yields of 46.2, 45, and 43.7 bu. per acre respectively. Early Mountain yielded well under favorable moisture conditions but appeared inferior to others in resistance. The conditions of the test were favorable for early maturing oats.

A barley test was conducted on spring disked and harrowed corn stubble seeded April 20 by a single disk drill. The highest yields were produced by the 6-rowed barley Gaitami, No. 575, and the 2-rowed Hannchen, No. 531, 38.3 and 35.6 bu. per acre respectively. Among hull-less barleys Sangatsuka, No. 78, and Swan Neck, No. 187, produced the highest grain yields of 1,368 and 1,358 lbs. per acre respectively.

Brown County Dent, Early Pride, and Minnesota No. 23 proved considerably later than Northwestern Dent corn. "One may be almost certain of raising seed if the seed plat is placed upon some elevated portion of the farm. Early frosts will thus be obviated."

Kubanka wheat produced a higher yield when sown at the rate of 111 lbs. per acre than at higher or lower rates. The heaviest sowings of Ghirka wheat and Early Mountain oats tested were 120 and 78 lbs. per acre respectively. Each produced the highest yield obtained in the sowing test of that variety. All 3 tests were conducted on undisked spring plowed wheat stubble, worked down with a peg-tooth harrow and packed once with a subsurface packer. Such land produced 25 and 22½ bu. per acre respectively when packed twice and when left unpacked. A table states the results of milling tests of 8 wheat varieties grown in 1909 and 13 grown in 1910. "With the exception of the two durums the wheats show a rather small percentage of flour; Kubanka leading, with 74 per cent total flour in 1909." The 1910 flour percentage appeared higher than that of the previous year and the bran and shorts correspondingly lower. Red Fife proved superior to most others in milling quality. "It is remarkable in having nearly as much total flour as the best durums, and it has 6 per cent more patent flour than any of the others." It produces as much flour per acre as Ghirka which yielded 5½ bu. more grain.

In a test of 23 potato varieties Early Bird and Early Eureka led with 142.7 and 137.1 bu. per acre respectively. Small and large uncut tubers and cut sets weighing 2, 12, and 1.5 oz. each respectively required 13.6, 76.5, and 9.4 bu. of seed per acre respectively in planting. They produced 3.5, 9.9, and 2.8 stalks per hill, and 88.9, 162.3, and 115.7 bu. per acre respectively, valued at $80.32, $130.20, and $109.36, after subtracting the cost of seed. "The heavy seeding had the greatest number of stalks per hill, but we did not find an appreciable larger percentage of small potatoes on this plat." In another test of the use of cut and uncut tubers it was found "that the hill with many vines had the smallest percentage of large tubers. But the relations were not striking."

On moisture conservation plats spring plowing with ordinary methods of cultivation, fall plowing with moisture conservation methods, and alternate summer tillage, produced 3-year average corn yields of 28.2, 26, and 17.9 bu. per acre respectively. These averages include a total failure of the corn crop in 1908, the first year of the test. Wheat under the same conditions yielded 22.8, 20.4, and 32.1 bu. per acre, oats 45.4, 39.1, and 59.7 bu. per acre, and barley 33.9, 31.4, and 34.7 bu. "For the 3 years of trial the crops from the summer tilled plats have not produced enough additional yields to pay for the loss of the one season. . . . Corn grown after summer fallow yields less than when the crop is grown continuously."

Wheat, oats, corn, barley, peas, and rye were used in various combinations in 12 three-year rotations which had completed their first round. Fall plowing, spring plowing, summer fallow, and disking were tested in the same rotation series. Two year's small grains with peas 1 year as green manure gave an average annual income of $12.30 per acre, 2 year's small grains with rye 1 year as green manure, $13.50, 2 year's small grains with 1 year clean fallow, $14.25, 2 year's small grains with 1 year corn, $18.05, and 2 year's small grains with one crop of corn dressed with 10 loads of stable manure per acre, $20.75. Wheat on summer fallow produced an average income of $12.50 per acre, on fall plowing $15.60, and on spring plowing $16.25. The author regards these conclusions as tentative and subject to change on further investigation.

The results of other tests of rotations are graphically indicated.

[Irrigation, dry farming methods, range conditions, and plant breeding], R. W. Clothier, J. J. Thornber, and G. F. Freeman (*Arizona Sta. Rpt. 1910, pp. 367–370, 371–374, 378–383*).—After fallow, heavy soil not irrigated or previously cropped yielded 3.18 tons, 2 tons, and 317 lbs. per acre respectively of sorghum, Kafir corn, and brown Tepary beans. A lighter soil after 2 years' cropping and 1 year's fallow yielded 2.56 tons, 10.4 bu., 9.1 bu., and 232 lbs. respectively of sorghum, squaw corn, soft Mexican corn, and brown Tepary beans, while this lighter soil cropped the 3 years preceding yielded 1.26 tons of sorghum and 7.2 bu. of white Flint corn. The maize yields are the estimated correct yields that would have been secured had the crop not been decreased 15 to 20 per cent by birds.

Under irrigation on light soil, Red Dent corn 400 ft. and 170 ft. from the tank, yielded 5.7 and 11 bu. per acre respectively, brown Tepary beans 230 ft. distant yielded 732 lbs., sorghum 360 ft. away 2.1 tons of forage and 400 lbs. of seed, and white Flint corn 525 ft. distant produced an estimated yield of 16 bu. per acre, allowing 40 per cent damage by birds. Milo maize yielded 1.75 tons of forage and 25 bu. of grain, or double this amount, allowing for the 50 per cent damage done by birds. It is estimated that these plats received 2 acre-inches of water from December 1 to May 17. Between May 17 and June 7 two-thirds of the area was given another irrigation of 2 acre-inches applied by furrows.

Fallowing did not succeed in storing last season's rainfall, probably because the rainfall penetrated only 2½ ft. deep and a crust persistently formed beneath the dust mulch in spite of the maintenance of 5 in. of loose dry soil. The daily variation of soil temperature must cause a constant air circulation, removing the soil moisture.

On the range silver top or feather blue stem (*Andropogon saccharoides*) proved drought resistant but "other grasses sown at this time, including sweet grass (*Chloris virgata*), Rhodes grass (*S. gayana*), and fine top salt grass (*Sporobolus airoides*), died out completely." The yields of various lots of hay cut at different points during the past summer are reported. The prevailing grass or grasses on each tract are stated.

In variety tests during 1910, 10 Asiatic strains of alfalfa, mostly Turkestan, averaged 88.33 per cent in stand and 48,783 lbs. in total yield of green hay for the season, 5 United States strains averaged 86.69 per cent and 49,034 lbs., 7 Mexican and South American strains averaged 87.72 per cent and 45,258 lbs., and 4 European strains 86.83 per cent and 50,463 lbs., and 4 strains from Arabia, Algeria, and the Mediterranean littoral 65.35 per cent and 37,265 lbs. per acre.

A progress report is given of tests of brown Tepary beans obtained among the Papago Indians.

[Variety and manurial tests with cereals and root crops], P. H. Foulkes et al. (*Field Expts. Harper-Adams Agr. Col., and Staffordshire and Shropshire, Rpt. 1909, pp. 1–26, 32, 37–49, pls. 2*).—This is a report for 1909 of field experiments begun in 1902.

A test to determine the requirements of meadow herbage and the profitableness and residual value of natural and artificial fertilizers showed the highest net 4-year profits after an application of (1) 2½ cwt. superphosphate and ⅔ cwt. sulphate of potash, (2) the same mixture with 1⅐ cwt. nitrate of soda, and (3) 2½ cwt. superphosphate alone. In another test superphosphate alone produced more economical results than when used with kainit or lime nitrate and excelled potassic superphosphate used alone.

In a test of 15 wheat varieties Garton 3,408 Red and Garton 3,608 White produced the highest yields of about 53 bu. per acre each. In a comparison of different nitrogen and potash sources in connection with superphosphate for barley 4 cwt. of potassic superphosphate yielded 48.6 bu. per acre, or 7.1 bu. more than the check plat. The same fertilizer with 112 lbs. nitrate of soda yielded 52⅓ bu., with 130 lbs. nitrate of lime 60 bu., and with 84 lbs. sulphate of ammonia 61½ bu. per acre. The last three mixtures were equivalent in nitrogen content, and the last equal in cost to mixtures of (1) 84 lbs. of sulphate of ammonia and 5.4 cwt. of superphosphate, (2) 84 lbs. of sulphate of ammonia, 512 lbs. of superphosphate, and 115 lbs. of kainit, and (3) 84 lbs. of sulphate of ammonia, 360.8 lbs. of superphosphate, and 80.8 lbs. of kainit, which were followed by yields of 50½, 64, and 64 bu. of grain per acre respectively. When sulphate of ammonia was used with both, 4 cwt. of potassic superphosphate produced 3½ bu. of grain per acre more than did superphosphate and kainit, supplying the same amounts of plant food at a lower cost. A chart shows the oat yields secured in variety tests during 1903, 1907, and 1909.

In both 1908 and 1909, 8 cwt. of basic slag produced higher and more economical increase in yields of mangels than 7¾ cwt. of superphosphate or 6 cwt. of potassic superphosphate, when each was used with 15 tons of farmyard manure. During 1907–1909 an application of 10 cwt. of salt per acre was followed by the highest average increase, 8 tons 6⅗ cwt., of mangels. Analyses showed no difference in sugar percentages or dry matter following applications of 2½, 5, 10, and 15 cwt. of salt per acre. A table states the results obtained in 1904–1909 in a test of 28 varieties of mangels.

In a test of the comparative feeding value of swedes, grown after wheat, and treated with basic slag (30 per cent) and superphosphate, the amounts applied were 10½ and 7½ cwt. respectively; the yields 16 tons 10 cwt. and 17 tons 12 cwt., and the total feeding values £44 16s. 6d. and £43 12s. A table states the results of tests comparing nitrogen, phosphorus, and potassium as fertilizers for swedes during 1905–1909 and a special test of 5 phosphorus sources applied in amounts costing £1 per acre each during 1907–1909. In another test, yields of 20 tons 13 cwt. and 22 tons 6 cwt., respectively, followed the use of (1) 3½ cwt. potassic superphosphate, and (2) 3 cwt. superphosphate and 2 cwt. kainit, each in conjunction with 4 cwt. steamed bones and 1 cwt. sulphate of ammonia. The check plat yielded 15 tons 3 cwt. and the results agree with those of the previous year. A table states the result of tests of 48 varieties during 1904–1909.

In variety tests of potatoes, Epicure produced the highest yield among the early varieties, and was ready for digging early in July. Colleen was the best of the second earlies, and Cottar of the main crop varieties. As in previous years, immature second crop seed produced a heavier crop of salable potatoes than ordinary mature seed. Greened seed remained unharmed at 30° F. and produced strong sprouts after being exposed to a temperature of 28°, while ungreened potatoes were slightly frosted at 30°, badly frosted at 28°, and entirely killed at 26°.

Salt and copper sulphate had little, if any, effect in the destruction of thistles.

The germination of beans was considerably accelerated by steeping in 10 per cent ammonia solution, especially for periods of 24 and 36 hours. After the tenth day those steeped for 12 hours grew more rapidly than those steeped for a longer period.

Tables state the results of applications of various fertilizers to grass at different centers, and of tests of manufactured compounds on swedes and mangels. Among grass mixtures shown in 1908 with barley as a nurse crop, the use of 4 lbs. each of red clover, white clover, and Pacey's perennial rye grass, and 2 lbs. each of alsike and Italian rye grass, produced the highest 2-year average yield of 2 tons 414 lbs. per acre.

Possible rotation crops for southern Rhodesia, H. G. Munday (*Rhodesia Agr. Jour., 8 (1910), No. 1, pp. 59–68, pls. 2*).—Attempts to establish dry-land alfalfa appeared unsuccessful, but "it seems probable that Egyptian clover will prove a good summer rotation crop with maize."

The velvet bean excelled the cowpea as a hay crop and was more palatable to cattle than other hays fed. It was successful for either dry fodder or ensilage when planted 3 by 1½ ft. apart, or at the rate of 25 pounds per acre, and produced nodules while the cowpeas did not.

The yellow lupine proved earlier than the white or blue, but the blue appeared the heaviest cropper. The Virginia Mammoth peanut and a local variety yielded 697 and 451 lbs. per acre respectively, but were seriously injured by crows.

Boer manna proved more drought resistant than Japanese millet and yielded ¾ ton per acre of dry forage. The author recommends it in rotation with corn and for use in breaking in land.

Teff grass is recommended as a green manure or as a cleaning crop on old land. Ten weeks after sowing it yielded a ton per acre and 3 weeks later was 6 or 8 in. high.

Bobs rust-proof wheat proved slightly earlier and less rust resistant than Victoria, but yielded about 10 bu. per acre.

From the Veliko-Polovetz Experiment Station of the Byelaya-Tserkov Estates of Countess M. E. Branitski, I. SKRODSKI (*Khoziaistvo, 1909, No. 12; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 1, pp. 96, 97*).—Clover was cultivated by Rafar's method, which aims to obtain clover seed in the first year of growth. The sowing takes place early, in rows, without a top-dressing. The yield was 9 poods per dessyatina (120.24 lbs. per acre).

Sugar beets planted in 13-in. rows at distances of 4½, 6, and 7½ in. yielded 1,454, 1,470, and 1,170 poods per dessyatina respectively.

Fallow culture according to data of the Poltava Experiment Field, K. MANKOVSKI (*Selsk. Khoz. i Liesov., 1909, Aug.; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 1, pp. 93–95*).—The author believes that the advantages of early fallow are unquestionable, but since farmers frequently do not find time to plow until June a means was sought for diminishing the injurious influence of the late plowing of the fallow. Such a means was found in the early surface cultivation of the fallow in the spring with a Charles plow. Three such cultivations increased the rye yield 23 per cent and the wheat yield 42 per cent.

The grazing ranges of Arizona, J. J. THORNBER (*Arizona Sta. Bul. 65, pp. 245–360, pls. 13, figs. 5*).—The author devotes successive chapters to climatic conditions; forage plants of Arizona and their relation to rainfall; protected enclosures *v.* open ranges; storm water embankments or dams; cultural operations on the small range reserve; and the past, present, and future of grazing ranges.

He concludes that under present conditions where the chief forage plants are winter and summer annuals, mesquite, and cacti, fencing ranges at the lower altitudes is not warranted. The most economical plan for handling such ranges is apparently moderate grazing, especially after the plants have begun to dry up in the spring. The best forage returns are secured from saltbushes when they are kept moderately closely browsed without being eaten to bare stumps or allowed to form brushy thickets.

Seven embankments ranging from 270 to 594 ft. in length and from 12 to 24 in. in average height were built to test their practicability for range reclamation purposes. Swales, old roads, and other favorable situations within a small range enclosure were chosen for the purpose of confining the rainfall of a more or less definite watershed on a limited area. The 7 embankments benefited not more than 5.7 acres at a total cost of $115 for building. The heavier growth made over the benefited areas by certain native plants "is by no means commensurate with the cost of constructing the dams."

Work already reported (E. S. R., 13, p. 731) is summarized, together with cultural work with grama, blue stem, dropseed, triple-awned, porcupine or needle, and miscellaneous grasses, Metcalf's bean, saltbushes and related plants, annual forage plants, sorghum and allied species, and root planting experiments with miscellaneous species. In the cultural work practically all the grama grasses did well in the forage garden when flooded in addition to the heavy rainfall but gradually died out with average summer rains and little or no flooding from storm water. Silver top or feather blue stem yielded about ¾ of a ton to a ton of hay per acre with average rainfall and annual flooding, and resisted prolonged drought remarkably well. The drop seed grasses including sacaton started well on areas occasionally flooded with storm water but died out completely before the rains of the following summer begun. With flooding and heavy rainfall Texas millet, finger grass, shama millet or jungle rice, water or everlasting grass, and barnyard grass, gave fair to excellent results. Sorghum and allied species including Jerusalem corn, Kafir corn, and Egyptian corn grew to a height of a foot or so on land occasionally flooded, but dried up before reaching maturity. "Their growth should not be attempted except with irrigation." "Root planting experiments were generally unsuccessful and are not recommended under our conditions." The best results in seeding were obtained when seed was sown after disking and before harrowing, but wild oats, Schrader's brome-grass, and other coarse seeds did best when disked in. Very fine seeds must be sown after final harrowing and saltbush seeds did best when sown a few inches deep and covered with a loose mulch.

An earnest plea is made for government control over grazing ranges in Arizona and for the leasing and fencing of these ranges as a means to their restoration and permanent use.

Notes on the winter pasture plants and grasses, H. G. MUNDY (*Rhodesia Agr. Jour., 8 (1910), No. 1, pp. 106–110, pl. 1*).—A stand of *Paspalum dilatatum* was secured by planting slips from old roots in drills $2\frac{1}{2}$ by $1\frac{1}{2}$ ft. apart. A week later 3 lbs. per acre, or one-fifth the normal amount of seed, was sown. In spite of drought, practically all the slips planted on a $\frac{1}{4}$-acre plat grew.

Toowomba canary grass (*Phalaris bulbosa*) proved inferior to Paspalum in drought resistance, but may prove superior in frost resistance. Sheep burnet (*Sanguisorba minor*) proved a very hardy, rapid-growing perennial, and almost entirely resistant to frost and drought. The author also reports experimental sowings of cocksfoot, tall fescue, perennial and Italian rye grasses, sheep parsley (*Petroselinum sativum*), sulla (*Hedysarum coronarum*), rescue grass, brome grass, red clover, and sainfoin.

On the improvement of grasses and clovers at Svalöf, H. WITTE (*Sveriges Utsädesför. Tidskr., 20 (1910), No. 6, pp. 317–331, pls. 2, fig. 1, dgms. 2*).—This progress report discusses the work of domestic seed production and states the results so far obtained, with reference to the literature on the subject.

Report on cooperative trials and investigations of grasses and clover fields, 1905–1909, K. HANSEN and M. L. MORTENSEN (*Beretning om Forsög og Undersögelser i Græsmarker, 1905–1909. Lyngby, Denmark, 1910, pp. 108*).—The investigations here described were conducted by the Prästö County Agricultural Society, and include a careful inquiry into the condition of meadows and pastures in the county, trials of different grass seed mixtures on 8 different farms with botanical examinations of the green crops, tests of soil inoculation for alfalfa, trials of different cover crops and fertilizers for meadows.

Report of breeding experiments with grasses, 1909, H. WITTE (*Sveriges Utsädesför. Tidskr., 20 (1910), No. 5, pp. 273–277*).—The author reports the results of experiments and variety tests of red clover, alfalfa, timothy, orchard grass, perennial rye grass, meadow fescue, tall oat grass, and other grasses.

Variety tests during 1908, O. LEMMERMANN and P. LIEBAU (*Mitt. Agr. Chem. Vers. Stat. Berlin, 1907, pp. 18*).—Among the varieties tested, the highest yields were obtained from Petkus winter rye, Criewen winter wheat, Sächsish Erzgebirgs summer rye, Friedrichswerth bearded summer wheat, Selchow and Svalöf Chevalier summer barleys, Svalöf Goldrain oats, Green Folger field peas, Halberstädt field beans, Jaensch Victrix sugar beets, Yellow Eckendorf fodder beets, Lobberrich Yellow carrots, and White Queen potatoes. The Victoria potato produced the greatest starch yield per acre. A brief report is given of the results of sowings of red clover seed from Hungary, Russia, England, France, Bavaria, and other countries. Tables state the precipitation and temperature during each day of the vegetation period, the yields obtained, and other data gathered with regard to the varieties tested.

Variety tests during 1907, O. LEMMERMANN and P. LIEBAU (*Mitt. Agr. Chem. Vers. Stat. Berlin, 1908, pp. 20*).—Data corresponding to the above are reported for 1908.

The highest yields were obtained from Petkus winter rye, Buhlendorf Yellow winter wheat, Groninger II winter barley, Petkus summer rye, Japhet and Strube bearded summer wheats, Svalöf Chevalier II and Nolc Imperial Type A summer barleys, von Lochow Yellow oats, Kirsche horse beans, von Meyer sugar beets, Yellow Eckendorf fodder beets, Lobberrich von Lambert carrots, and Emperor potatoes. The White Queen potato stood highest in yield of starch per acre.

Cooperative variety tests conducted by county agricultural societies in Sweden, 1909, P. BOLIN (*K. Landtbr. Akad. Handl. och Tidskr., 49 (1910), No. 7, pp. 591–636*).—Three squarehead strains excelled all other wheats in grain and straw yield, but were not tried at many farms, and of the remainder, no variety had a consistent and decisive advantage. Seger and Goldrain usually excelled other oat varieties. Gullcorn and Hannchen produced higher average barley yields than other varieties tested. Among eating potatoes, Up-to-date and Ever-good excelled other varieties except at 2 centers where Kejsarkrona stood second. Silesia, Fürst Bismarck, and Brockern led among factory potatoes. A table sums up the results obtained in tests of fodder beets and other root crops.

Report of the Ultuna substation of the Swedish seed grain association, 1909, A. ELOFSON (*Sveriges Utsädesför. Tidskr., 20 (1910), No. 5, pp. 278–288*).—Tables state the yields obtained and the weight per bushel and per thousand kernels. Pudel wheat produced the highest average yield during 1897–1909, but not all varieties are reported for each year of the test. Of the numerous varieties and improved strains tested during 1906–1909, Petkus rye produced the highest yield, while in an oat test the Fyris and Klockhafre II produced the highest average yields of 3 localities. The results of tests of improved strains of legumes and grasses are also reported.

Correlation of characters in corn, E. C. EWING (*New York Cornell Sta. Bul. 287, pp. 67–100, figs. 2*).—This is a thesis submitted for the degree of master of science in agriculture. The author reviews the literature of the subject, discusses the use of correlation in breeding, and summarizes previous work.

Correlation statistics were gathered from about 812 individual plants of Funk Ninety Day corn. The data are reported in correlation tables from which the following coefficients of correlation are derived.

Coefficients of correlation of the weight of grain and certain other corn characters.

Relative character.[a]	Coefficient of correlation.	Relative character.[a]	Coefficient of correlation.
Diameter of stalk	0.393±0.020	Length of ear at appearance of silks	0.218±0.033
Length of leaf	.292± .021	Date of appearance of tassel	−.153± .023
Breadth of leaf	314± .021	Date of appearance of pollen	−.090± .024
Height of mature plants	.203± .025	Appearance of silks	− 202± .023
Height of seedlings	.219± .037	Duration of flowering period	− 046± .062
Number of internodes	.228± .023	Number of branches in the tassel	−.009± .048
Average length of internodes	−.004± .027		
Percentage of internodes below the ear	.025± .024		

[a] The weight of grain is subject in each case.

Curves show the variation in weight of grain and in height of mature stalks while tables show the variation constants and summarize the correlation coefficients. The author concludes that "it is improbable that much use can be made of correlation in practical breeding. . . . This is especially true of correlation between seed production and other characters."

A bibliography of 32 titles is appended.

Selecting and judging corn, C. B. HUTCHISON (*Missouri Sta. Circ. Inform. 45, pp. 85–88, fig. 1*).—Directions for the selection of corn for show are accompanied by a score card and statement of variety standards and by directions for applying the points of the score card.

Maize variety test at Skinners Court, season 1909–10, J. A. T. WALTERS (*Transvaal Agr. Jour., 9 (1910), No. 33, pp. 52–55*).—A table states the time of planting, flowering, and ripening, the average weight per ear, and the height of 42 varieties of corn, mainly from the United States. Results indicate that the time from the first appearance of the plant above ground to flowering is exactly half the total time required for ripening. Will Gehu and Will Dakota ripened seed in 87 days.

Sulla clover, H. W. BUDD (*Jour. Dept. Agr. Victoria, 8 (1910), No. 12, pp. 800, 801, fig. 1*).—The plants were watered once and by July 10 averaged 5 ft. in height, another second growth was 2 ft. high in October. "The plant is eaten greedily in its green state by cattle, and should prove an eminently satisfactory crop for dairy winter feeding, or for ensiling." Tables report chemical analyses of the first and second growths.

Guide to cotton culture in the German Colonies, A. ZIMMERMANN (*Anleitung für die Baumwollkultur in den Deutschen Kolonien. Berlin, 1910, pp. VII+159, figs. 26, dgms. 2*).—This is a manual of information for the use of the cotton grower in the German Colonies. The plant is described, the principal varieties discussed, and directions given for seed production, choice of soil and climate, laying out and preparation of fields, fertilization, irrigation, sowing, cultivation, harvesting, handling, and seed selection. Suggestions are also given for rotations and the prevention of injury by insect pests and diseases. A full bibliography is given.

Japanese cane for forage, J. M. SCOTT (*Florida Sta. Bul. 105, pp. 53–68, figs. 5*).—A discussion of the history, uses, and soil requirements of Japanese cane is followed by directions for saving seed cane and for producing and harvesting the crop.

A table presents the results of two years' fertilizer tests of dried blood, sulphates of ammonia and potash, muriate of potash, acid phosphate, and ground limestone in various combinations. Considerably the highest yields of cane in 1909 followed applications per acre of (1) 112 lbs. dried blood, 84 lbs. muriate of potash, 224 lbs. acid phosphate, and 2,000 lbs. ground limestone, and (2) 112 lbs. of dried blood, and 84 lbs. muriate of potash, while in 1910 the highest yield followed the use of 72 lbs. sulphate of ammonia in place of the dried blood. The author regards the best formula for use on this crop as an unsettled question, but suggests that the use of from 400 to 600 lbs. per acre of a mixture containing 3 per cent of ammonia, 6 per cent of phosphoric acid, and 7 per cent of potash, with 2,000 lbs. per acre of ground limestone.

The air dried sample of the cane was found to contain 6.75 per cent water, 1.37 per cent protein, 1.89 per cent fat, 20.60 per cent fiber, 2.04 per cent ash, and 67.35 per cent nitrogen-free extract (sugars, etc.).

Investigations of old Norwegian oat varieties, W. CHRISTIE (*Tidsskr. Norske Landbr., 17 (1910), No. 3, pp. 129–158*).—This is an address delivered before the Society of Norway's Weal.

The peanut, W. R. BEATTIE (*U. S. Dept. Agr., Farmers' Bul. 431, pp. 39, figs. 20*).—A revision of Farmers' Bulletin 356 (E. S. R., 21, p. 136), treating of peanut culture, insects and diseases affecting the crop, and other topics.

Fertilizing potatoes in 1909, N. MAZVERSIT (*Abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 3, p. 421*).—An application to potatoes was made of 120 lbs. of superphosphate, 86 lbs. of potash fertilizer, and 86 lbs. of niter per acre. The yield from the fertilized plat was over three times that from the unfertilized plat.

Relation of spring harrowing to the stooling of winter rye, S. A. KUZNITSKI (*Dnevn. XII. S''iezda Russ. Est.-Isp. i Vrach. [Moscow], No. 7, p. 304; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 1, pp 98, 99*).—Five years' experiments in the Moscow government indicate that harrowing in the spring increases the average yield by 9 poods per dessyatina (about 120 lbs. per acre). The mean numbers of stems per stool on the harrowed and unharrowed plats were 2.6 and 2.2 respectively, while the percentages of larger stems were 55.1 and 49.1, respectively.

Report of work with rye in 1909, E. W. LJUNG (*Sveriges Utsädesför. Tidskr., 20 (1910), No. 4, pp. 256–258*).—In a test of 19 varieties Petkus rye produced the highest grain yields per acre. A table states the average yield secured on 3 plats of each variety, the weight per thousand kernels and per bushel, the date of ripening, and the relative strength of straw of the different varieties. References are given to the literature of the subject.

The importance and improvement of the grain sorghums, C. R. BALL (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 203, pp. 45, figs. 13*).—This bulletin states the location, boundaries, and general characteristics of the grain sorghum belt, outlines the history of the crop, and discusses its uses as food for men and animals. Suggestions for needed improvements are made under the heads of drought resistance, earliness, dwarfness, productiveness, and adaptability to machine handling through the elimination of pendent heads.

The protein content ranges from 7.93 to 16.63 per cent and "high protein varieties and strains can probably be readily developed by selecting for this quality." Analyses of grain-sorghum kernels are reported in tabular form and compared with analyses of corn, corn products, and sorghums compiled from sources previously noted (E. S. R., 4, p. 582; 19, p. 564; 20, p. 1063). Other tables of results compiled and adapted from the reports of the state boards of agriculture of Kansas and Oklahoma show the acreage value and yields of grain sorghum, kafir corn, milo maize, and corn crops for certain years since 1893.

Experiments indicate that in the Panhandle from 7 to 8 in. is the proper row space for milo maize and durras, from 9 to 10 in. for Kafir corn, and from 5 to 6 in. (in 3½ ft. rows) for kowliangs. Single plants in the drill probably give better results than the same number in hills. They are more readily selected and harvested and appear to produce fewer suckers.

[Sugar beet culture and the sugar industry in Uruguay], J. PUUIG Y NATTINO (*Rev. Asoc. Rural, Uruguay, 39 (1910), Nos. 7, pp. 495–502; 11, pp. 893–899, dgms. 3*).—The author gives analyses of sugar cane of various countries, of clarification residues, and of Kleinwanzsleben sugar beet seed of the season of 1909, together with data as to the weight per 100 seeds, the percentages of large, small, and medium sized seeds and of impurities in samples tested, the germination percentage, and the proportions of seed balls with 1, 2, 3, and 4 germs each.

The assimilation of the chief nutritive substances by beets during the vegetation period, A. I. DUSHECHKIN (*Dnevn. XII. S''iezda Russ. Est.-Isp. i Vrach. [Moscow], No. 5, 197; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt.*

Landw.), *11* (*1910*), *No. 1*, *pp. 141, 142*).—Beets were grown with and without applications of phosphoric acid and examinations made at 10-day intervals.

It was found that the increase in total weight proceeded uninterruptedly almost to the end of the experiment. The growth on the fertilized soil was completed earlier and the weight was greater, while the leaves completed their growth earlier and the roots later. In the first period of growth the weight of leaves predominated, later that of the roots. The percentages of dry matter and sugar both increased, but the percentages of ash, nitrogen, potash, and phosphoric acid decreased. Their absolute amounts show that the assimilation of ash, nitrogen, potash, and phosphoric acid proceeds with the growth in total weight and is completed somewhat earlier than that of dry matter.

[Relation of early and late planting of sugar beets to premature shooting and to the harvest], P. SCHUBART (*Centbl. Zuckerindus.*, *19* (*1910*), *No. 12*, *pp. 359, 360*).—The author reviews and discusses his own and other published work on the breeding of beets that do not shoot during the first season.

Svalöf Extra-squarehead II, H. NILSSON-EHLE (*Sveriges Utsädesför. Tidskr.*, *20* (*1910*), *No. 3*, *pp. 14–167*, *pl. 1*; *abs. in Bot. Centbl.*, *114* (*1910*), *No. 49*, *pp. 606, 607*).—This variety of wheat is a hybrid of Extra-squarehead and Grenadier II, which has proved especially adapted to southern Sweden. It possesses the cold and rust resistance of Extra-squarehead and the high yielding qualities and stiffness of straw of Grenadier. In other qualities, it is intermediate between the parents. Tables state the results of tests at Svalöf, Alnarp, and other points, in comparison with the parents and two other squarehead wheats.

Work with wheat and oats at Svalöf, 1909, H. NILSSON-EHLE (*Sveriges Utsädesför. Tidskr.*, *20* (*1910*), *No. 6*, *pp. 332–353*).—The work reported includes tests of improved strains of winter and spring wheat and of oats.

In a test of 19 winter wheat varieties, Renoldad Grenadier produced the highest yield of grain per acre. A table states the yields of grain and straw obtained on 3 plats of each variety, the weight per thousand kernels and per hectoliter of grain, the date of ripening, and the cold resistance of each variety. In a test of 4 varieties during 1906–1910, Extra-squarehead II produced the highest average yield, but in 1910 it was excelled by the hybrid of Grenadier and a strain of Kottehvete. In a test of 12 spring wheats, a variety from Tangâbohuslan produced the highest grain yield, while in a test of 25 oat varieties Probsteier 0318 produced the highest yield.

The author includes references to the literature on the subject.

The sulphur bleaching of commercial oats and barley, L. M. SMITH (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 74*, *pp. 13*, *figs. 4*).—The author discusses the methods used in sulphur bleaching. Every sample of oats so bleached had a higher moisture content after bleaching. The increase was not constant because of different methods of operating the various bleachers and difference in the quality and condition of the grain before bleaching. The average moisture content before bleaching was 11.38 per cent as compared with 13.17 per cent after bleaching, and every sample showed some increase. The loss of moisture "due to evaporation in handling between the bleacher, the elevator, and the car" was 0.50 per cent. The average weights per bushel before and after bleaching were 27.46 and 26.12 lbs. respectively. This decreased weight per bushel was insufficient to prevent oats from being given a higher grade because of their improved appearance.

Tests with culture media, made by Mrs. Flora W. Patterson, indicate that the number of species of fungi growing on oats and barley were greatly reduced by bleaching. "Their growth is not only greatly retarded, but it is in no instance so luxuriant, even with the same species, as in the cultures made from the unbleached grain." It is thought that the benefit derived in case of grain handled under commercial conditions will depend upon proper cooling and drying after bleaching. Six days' germination test of bleached and unbleached oats indicated that the germination percentage had fallen from 86.92 to 68.14, while that of barley decreased from 91.72 to 73.45. It was not observed that any of 4 horses fed on bleached oats failed to eat them as readily as the unbleached oats. The net profit arising from the improvement in grade and increase in weight obtained from bleaching is estimated to be 2.26 cts. per bushel.

On measures for the encouragement of a domestic seed production, A. ELOFSON (*K. Landtbr. Akad. Handl. och Tidskr., 49 (1910), No. 5, pp. 408–423*).—This address discusses the present conditions of seed production in Sweden and methods by which it may be developed to meet the requirements of the country.

Seed tests, A. J. EWART (*Jour. Dept. Agr. Victoria, 8 (1910), No. 12, pp. 774–780*).—Results of tests of garden, grass, clover, and alfalfa seeds are reported. Some were home grown, and others were tested after sea voyages of from 6 to 42 days. A table states the place of origin of the seed, the duration of the sea voyage, the percentage of weed seeds, the germination percentage, and the fungus spores found. Descriptive notes report other observations made.

Seed tests made at the station during 1910, G. T. FRENCH (*New York State Sta. Bul. 333, pp. 12*).—The author presents in tabular form and discusses the results of purity and germination tests of alfalfa, clover, grass, and other seeds. The frequency of occurrence of various weed seeds is indicated and a brief list of bulletins on seeds and weeds appended.

Dodder was found in 11.13 per cent of the alfalfa samples tested and 3.5 per cent of the red clover samples. More than half of the dodder was of the large-seeded variety—a larger proportion than in preceding years. The frequent occurrence of the seed of *Centaurea repens* indicates the importation of alfalfa seed from Asia Minor.

Are our farm seeds pure?, F. H. HALL (*New York State Sta. Bul. 333, popular ed., pp. 4, fig. 1*).—A popular edition of the above.

HORTICULTURE.

The seedling-inarch and nurse-plant methods of propagation, G. W. OLIVER (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 202, pp. 43, pls. 9, figs. 15*).—In addition to giving full descriptions of the author's improved methods of propagating the mango, mangosteen, and litchi, this bulletin indicates the present stage of the Department's studies of these fruits and also shows the adaptation of the seedling-inarch method of propagation for the rapid flowering or fruiting of seedlings raised from seeds of new and rare trees, shrubs, and vines; for the rapid production of an abundance of material for propagation by budding and grafting; and for the rapid propagation of rare plants on hardy seedling stocks. The inarching of rose seedlings and of the rare finger lime (*Citrus australasica*) are described as examples of the wide adaptability of the seedling-inarch method. The author also reports that he has recently used this method with chestnuts, walnuts, hawthorns, oaks, and many other plants.

The seedling-inarch method consists, essentially, in inarching on young seedlings. It has proven far superior in its simplicity, rapidity, and results to the other method of inarching on plants growing in 5 and 6 in. pots. It also has a wider range of adaptability than budding and requires much less skill. The author reports that he has had very few unsuccessful unions and none among those classes of plants where the most suitable stocks are known and in common use. The seedling-inarch method appears to be the only one which has been successfully applied in the asexual propagation of the mangosteen.

The seedling may be used either as a stock or as a scion, depending on the plants employed or on the object to be attained. In the present work mango and litchi seedlings were used as stocks only, being united to shoots of approved varieties and in the case of the litchi with seedlings of other species of the same genus. The mangosteen, although hitherto propagated only by seedlings, has generally shown a large percentage of loss among the seedlings from a cause not as yet determined. In the present work, mangosteen seedlings were used as scions, being inarched with other species of Garcinia and even with species of different genera of the same family. The different stocks employed with the various plants are indicated. The results as a whole show that the worked plants are healthier and that the operation is many times cheaper than the older methods of propagation.

The nurse-plant method of propagation is a specialized form of the seedling-inarch method evolved after watching the behavior of certain seedling-inarched mangosteens. These plants developed a strong aerial root from the base of the scion about 18 months after the unions to other species of Garcinia were considered perfect and long after the top of the stock and the root of the seedling had been severed. These aerial roots elongated, pierced the ground, and then roots and top developed rapidly. In one or two cases the stock roots declined rapidly and in a few months' time the mangosteens were again on their own roots looking strong and healthy. Where the stems of the seedlings were inarched at a point 2 or 3 in. above the first pair of leaves on the stocks, there has been no attempt on the part of the scions to produce roots. This ability, under certain conditions, of inarched mangosteens to reestablish their own root systems led to trial of inarches in which neither root system was severed with the view of nursing mangosteen seedlings through the precarious stage of their early life. Several of these mangosteens worked by the nurse-plant method were sent to the Canal Zone and are reported as doing well. Those remaining in the greenhouse continue to make good growth and the stems of the mangosteens are showing more increase in diameter than the stems of the stock plants.

As to the future stages of growth of the mangosteens, the author issues the caution that the work has not proceeded far enough to determine how the inarched plants will behave under external conditions and how rapidly they will continue to grow on the stocks used. The mangosteen is well known to be a rebellious subject.

The methods of propagation employed have been presented in order that experimenters may test them further. The work of inarching is made clear by a number of photographic illustrations.

A study of bud selection with citrus fruits, A. D. SHAMEL (*Cal. Cult., 36 (1911), No. 13, pp. 387, 388*).—Under the direction of the Bureau of Plant Industry of this Department, the author is conducting studies of bud variation and selection with Washington navel oranges and grapefruit. The object and plan of this work is here outlined, together with some preliminary observations. The preliminary data secured from normal healthy trees show a great variation in the yield and quality of fruit.

Agricultural explorations in the fruit and nut orchards of China, F. N. MEYER (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 204, pp. 62, pls. 6, figs. 15*).—This bulletin comprises notes on the distribution, character, and domestic uses of various fruits, nuts, and edible seeds observed by the author during his agricultural explorations in the Chinese Empire. Consideration is given to both cultivated and wild forms observed, and with the more important fruits and nuts special cultural practices and local methods of curing and preserving are noted. Brief references are also given to forms which are either exotic or are not extensively grown in China.

Since the similarity in soil and climate between the native habitat of many Chinese products and certain areas of the United States is close, the possibility of introducing new kinds for direct cultivation and new and valuable strains of forms already grown in this country appears most promising.

Report of horticulturist, C. C. NEWMAN (*South Carolina Sta. Rpt. 1910, pp. 18–23, figs. 3*).—A brief progress report on various investigations with fruits and vegetables. The preliminary results from experiments in grafting apples with scions and stocks of from 3 to 12 in. long indicate that the shorter stocks and scions give larger and more regularly shaped trees.

The Heeleaka Experimental Station.—Final report, including investigations during the year 1909, G. D. HOPE and P. H. CARPENTER (*Indian Tea Assoc.* [*Pamphlet*] *4, 1910, pp. 25, pls. 7*).—In addition to the results secured from manuring experiments in 1909, a résumé is given of the results obtained during the 5 years the station has been in existence and which largely confirm the results previously noted (E. S. R., 23, p. 642).

The report concludes with a discussion as to the influence of climatic and soil conditions on the action of manures. Data are given on a number of plats which received no manure during the 5 years and which show a considerable increase in yield in response to careful and repeated cultivation. A study of the leaf returns during the 5 years shows that these yields are influenced both by climatic conditions of local character and by seasonal variation. In general the heaviest yields occurred during the months of heaviest rainfall. In connection with the application of soluble fertilizers, the results indicate that it is advisable to apply the fertilizers in small divided doses during the year in order to avoid the liability of loss in drainage water.

Gardening in the Tropics, G. M. WOODROW (*Paisley, 1910, pp. IX+634, pls. 35, figs. 55*).—This work is presented under the above title as the sixth edition of the author's Gardening in India. It is intended as a treatise on gardening as a means of profit as well as of pleasure and is designed for use in the Tropics and in the cultivation of tropical plants in mild climates.

Several of the first chapters treat of soil, climate, various cultural operations, garden tools and implements, noxious insects and garden pests, garden edgings, fences, laying out gardens, the mala or hot season garden, the conservatory, the lawn, preparing flowers for exhibition, horticultural myths, the romance of pollination, the life of the plant, rotation of crops, plant breeding by hybridization and selection, and the composition of plants. The greater portion of the work consists of descriptive and cultural notes on economic and ornamental plants suitable for hot climates.

The garden: A history of its formal arrangement, A. GRISEBACH (*Der Garten. Eine geschichte seiner künstlerischen Gestaltung. Leipsic* [*1910*], *pp. VIII+126, pls. 63*).—In this work the author aims to present a descriptive and pictorial account of formal gardening at different ages in Europe as distinct from landscape gardening. The successive chapters treat of the following subjects in detail: The geometric garden, the architectural style of pleasure gardens during the baroque period, special types of gardens, the development of individual garden parts since the Renaissance, and the garden revolution in the eighteenth century. Numerous examples are shown of the various types of gardens under discussion, the illustrations being obtained for the most part from copper plates and from the works of architects and garden lovers living during the period from the sixteenth to the eighteenth century.

A bibliography is given of recent and old literature and copper designs dealing with formal gardening.

FORESTRY.

The principles of handling woodlands, H. S. Graves (*New York and London, 1911, pp XXI+325, figs. 63*).—This book deals with the silvicultural treatment of woodlands, with special reference to the principles of cutting mature stands of timber with a view to their replacement by new growth, cuttings in immature stands for their improvement, and forest protection with particular reference to forest fires.

The subject is presented primarily from the standpoint of conditions as they obtain to-day. The introductory chapter contains general considerations relative to the American forest and the march of forest destruction, the scope and objects of silviculture, financial returns from forestry, classification of the trees in a forest, and silvicultural systems. The succeeding chapters discuss in detail the selection system, systems of clear-cutting, the shelterwood system, the coppice systems, improvement of the forest, protection of forests from fire, and protection from other injurious agencies.

The taxation of forests, F. R. Fairchild (*Rpt. Nat. Lumber Manfr. Assoc., 8 (1910), pp. 65–77*).—The author briefly summarizes the defects of the general property tax as related to forests, proposes the single tax on yield as an ideal forest tax, and presents some suggestions relative to bringing about tax reforms.

North American forests and forestry.—Their relations to the national life of the American people, E. Bruncken (*New York and London, 1908, pp. VI+265*).—A popular presentation of the subject intended for those who are interested in nature and those who take a living interest in all questions affecting the welfare of the Nation.

The introductory chapter points out the general relation between civilization and natural conditions. The succeeding chapters deal with the North American forest regions, the forest and man, forest industries, destruction and deterioration, forests and forestry, forest finance and management, forestry and government, fighting fires and thieves, forestry and taxation, reform in forestry methods, and forestry as a profession.

Cone-bearing trees of the California mountains, J. S. Chase (*Chicago, 1911, pp. IX+99, pls. 21, figs. 21*).—A popular guide to the pines, firs, and other coniferous trees native to inland and mountain regions of California. Aside from the use of definite botanical names, the author has restricted himself to giving the broad characteristics of each species as evidenced by full-grown trees of normal development.

Preliminary examination of the forest conditions of Mississippi, C. E. Dunston (*Miss. Geol. Survey Bul. 7, 1910, pp. 76, map 1*).—This report was prepared under the direction of the Forest Service of this Department at the request of the State of Mississippi.

It contains a general description of the State relative to its geology, topography, and climate, and a description of forests by regions, and discusses the various problems in forest management, including forest fires, grazing, turpentining, waste in logging, establishment and care of young stands, clauses suggested for logging contracts, assessments and taxation of timber lands, and management of tax on school lands. A review is given of past forest legislation, together with suggestions relative to needed legislation and the text of a suggested forest law.

Forest products of Canada, 1909, H. R. MacMillan (*Dept. Int. Canada, Forestry Branch Bul. 11, 1910, pp. 30, dgms. 2*).—This bulletin comprises statistics on the production of lumber, square timber, lath, and shingles in Canada in 1909 as determined from reports made directly to the Forestry Branch of the Department of the Interior by 2,085 operating sawmills.

The data given and discussed show the quantity and value of each product both by species and by provinces, including also the production by provinces of lumber of different species, imports of hard-wood lumber, and exports of square timber. In most cases comparative data are given for 1908.

Forest fires in Canada, H. R. MacMillan and G. A. Gutches (*Dept. Int. Canada, Forestry Branch Bul. 9, 1910, pp. 49, figs. 11*).—This bulletin contains data showing in a general manner the extent of forest destruction in the various Provinces of Canada, discusses the effects and causes of forest fires, and gives a statement of forest fires occurring in 1909. It concludes with advice to settlers regarding the handling of fires and important points in the forest laws.

In 1909 approximately 435,000 acres were burned over in the Provinces. Timber and improvements valued at $210,400 were destroyed and $331,821.42 was expended in fire protection and fire fighting.

Report on forest statistics of Alsace-Lorraine (*Beitr. Forststatis. Elsass-Lothringen, 1909, No. 28, pp. 126, dgms. 17*).—A statistical review for the year 1909 relative to the administration of the state, public, and community forests in Alsace-Lorraine. The detailed and summarized data deal with forest areas, silvicultural operations, products, revenues, expenditures, etc., including a comparative summary for each year since 1872.

The acquisition policy of the Prussian State Forest Administration in West Prussia and Posen, Semper (*Ztschr. Forst u. Jagdw., 43 (1911), No. 2, pp. 65–96*).—A historical and statistical account of forest extension and development in West Prussia and Posen.

The influence of moisture on the growth of the pine and the fir, E. F. Dambebg (*Dnevn. XII. S''i͡ezda Russ. Est.-Isp. i Vrach. [Moscow], 1910, No. 7, p. 269; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 1, p. 120*).—Investigations of certain forests in the Novgorod Government of Russia indicate that an excess of moisture retards the growth of the pine and fir. The action of the soil and underground waters is more marked on the pine than on the fir. Experiments showed that the firs absorbed from 2 to 3 times as much water as the pines.

Seed experiments with Pinus sylvestris, F. Story (*Trans. Roy. Scot. Arbor. Soc., 23 (1910), pt. 2, pp. 168–171, pl. 1*).—Cooperative experiments are being conducted in Scotland and at a number of forest experiment stations on the European continent to determine the relative value of Scots pine seeds secured from different countries and climatic conditions.

The results for the first 3 years are given of the tests as conducted at Bangor, Scotland. The seed was collected from trees ranging from 40 to 140 years of age. Thus far Belgium-grown seed from 40-year old trees has shown the best development. Since the results from other stations have not been published as yet, no final conclusions are drawn.

The reddening of fresh alder wood, F. W. Neger (*Naturw. Ztschr. Forst u. Landw., 9 (1911), No. 2, pp. 96–105, figs. 2*).—An investigation similar to that conducted on the greening of fresh linden wood (E. S. R., 23, p. 345) is reported relative to the reddening of fresh-cut alder wood.

The surface of fresh-cut alder wood takes on an intensive brownish-red color within a few hours from the time of cutting. The investigation showed that this discoloration is due primarily to oxidization in the presence of a certain moisture content in the wood. Alder wood which is air-dried when white does not become discolored when exposed to the atmosphere. The color body appears to be one of the iron-tannic combinations and oxidization does not take place until the cell walls are destroyed. A microscopic investigation as to the nature of the color body was conducted and is here discussed.

On the effect of different intervals between successive tappings in Para rubber (Hevea brasiliensis), M. K. Bamber and R. H. Lock (*Circs. and Agr. Jour. Roy. Bot. Gard, Ceylon, 5 (1910), No. 9, pp. 73–87*).—Experiments were started in the Tropical Gardens at Henaratgoda, Ceylon, in 1908 to ascertain what differences, if any, exist in the quantity, composition, and properties of rubber latex drawn from the trees by tappings carried out at different intervals of time. The trees are over 20 years old and planted in squares at a distance of 12 ft. apart. The plan of the experiments is given, together with the results thus far secured. The work is being continued.

Among the deductions thus far made it appears that the yield from trees tapped daily and from trees tapped weekly is practically identical for the same number of tappings, both in the gross and in proportion to the area of bark tapped. During the first few tappings the percentage of rubber contained in the latex decreases at a rate more or less inversely proportionate to the length of the interval between successive tappings. After a number of tappings have been made, a nearly constant percentage composition of the latex occurs which is lower in the case of trees tapped at short intervals than in the case of trees tapped at longer intervals. The proportion of scrap rubber obtained is lower in the case of the more frequent tappings.

Mature trees tapped daily for 18 months yielded for this period an average of over 7 lbs. of rubber per tree. At the four hundred and fortieth tapping, each tree yielded at the rate of 4 lbs. of dry rubber annually. The trees were quite healthy and showed no signs of having suffered from the severe tapping. From the standpoint of yield alone frequent tappings have given the best results, although from the standpoint of bark recovery the experiments have not been conducted sufficiently long to determine whether frequent tapping should be conducted throughout the year or whether the tree should be allowed to rest during certain months.

Tapping experiments with rubber trees in Misahöhe, Togo, compared with the results of other experiments, Gruner (*Tropenpflanzer, 14 (1910), Nos. 11, pp. 587–593; 12, pp. 649–655; 15 (1911), Nos. 1, pp. 36–39; 2, pp. 101–104*).—The results of tapping experiments with various species of rubber are given and compared with those secured with the same species in other rubber-producing countries.

Notes on creosoting, A. T. Gillanders (*Trans. Roy. Scot. Arbor. Soc., 23 (1910), pt. 2, pp. 172–179*).—A discussion of the relative merits of the pressure, boiling, and cold-immersion methods of creosoting timber.

With the view of determining the value of the cold-immersion process, the author conducted tests with 7 kinds of timber comparing it with the pressure process. The data secured indicate that on very small estates the immersion method is the better on account of its simplicity, and that it may be so managed as to be quite successful.

DISEASES OF PLANTS.

Report of botanist and plant pathologist, H. W. Barre (*South Carolina Sta. Rpt. 1910, pp. 23–26*).—In addition to the continuation of work on cotton anthracnose, sweet potato rots, and on the plant disease survey of the State, experiments looking to the best methods of controlling some of the common diseases of plants, and analyses of seed under the state seed law, have been undertaken and are here reported.

Greenhouse tests of seed from bolls attacked by cotton anthracnose have been followed by the appearance of the disease, while healthy seed planted on land previously grown to peas and oats last year, but planted to diseased cotton the previous year, gave plants entirely free from anthracnose. These experiments, it is claimed, demonstrated that the disease is carried in the seed, and can be eliminated by the use of clean seed and a one-year crop rotation. Many fields were found infested with anthracnose for the first time where the source of infection was traced to the use of diseased seed.

In experiments with the sweet potato rots, 100 bu. of potatoes harvested in November were immediately put into slatted bins 3 by 4 feet in a well-ventilated house, and the temperature kept at from 70 to 90° F. for 2 weeks, when the house was closed, and the temperature kept at from 50 to 60° during the rest of the winter. None of the common storage rots, such as Rhizopus, Mucor, Penicillium, and Fusarium, occurred, but black rot, with which the potatoes were already affected when stored, and a Nectria rot caused much damage, and by the first of April had destroyed the majority of the lot. It seems from this experiment that if the potatoes are sound and healthy when dug, this method of storage will prove a success.

Plant disease survey of South Carolina, H. W. BARRE (*South Carolina Sta. Rpt. 1910, pp. 29–39*).—In this progress report the distribution throughout the State by counties is given of the more common diseases of economic plants.

Plant diseases due to fungi, W. E. COLLINGE (*Rpt. Econ. Biol., 1 (1911), pp. 41–57, figs. 7*).—The author reports the prevalence, damage done by, and means of control of, the following diseases of economic plants: Brown rot (*Sclerotinia fructigena*); apple scab (*Venturia inequalis*); gooseberry sclerotinia (*S. fuckeliana*); sleepy disease of tomatoes (*Fusarium lycopersici*); wilt disease of tomatoes and cucumbers (*Mycosphærella citrullina*), a hothouse disease which is proving very injurious and becoming more prevalent each year; potato scab (*Oospora scabies*); yellow wart disease of potatoes (*Synchytrium solani*); finger-and-toe disease (*Plasmodiophora brassicæ*); bean anthracnose (*Colletotrichum lindemuthianum*); iris leaf blotch (*Heterosporium gracile*); hyacinth yellows (*Pseudomonas hyacinthi*); and Ornithogalum black mold (*H. ornithogali*).

New species of Texas fungi, F. D. HEALD and F. A. WOLF (*Mycologia, 3 (1911), No. 1, pp. 5–22*).—Descriptions are given of 41 new species of fungi, principally on economic plants, collected in the vicinity of San Antonio, Texas. Of the 12 genera represented, one belongs to the Ascomycetes (*Dimerosporium parkinsoniæ*), and the remainder are imperfect fungi.

A preliminary note on the life history and cytology of Spongospora subterranea, T. G. B. OSBORN (*Ann. Bot. [London], 25 (1911), No. 97, p. 271*).—As a result of investigation the author concludes that the genus Spongospora should be grouped with Plasmodiophora, Sorosphæra, and Tetramyxa in the family Plasmodiophoraceæ.

Contribution to the study of sooty molds, G. ARNAUD (*Ann. École Nat. Agr. Montpellier, n. ser., 9 (1910), No. 4, pp. 239–277, pls. 3, figs. 3*).—In a further study (E. S. R., 24, p. 152) of these fungi, the author discusses the habitat, mycelium, fructifications, and taxonomic position of *Pleosphæria citri, P. patagonica*, and *Calicium populneum*.

A bibliography is appended.

A new parasitic fungus found in the roots of grasses, E. J. SCHWARTZ (*Ann. Bot. [London], 25 (1911), No. 97, p. 270*).—In a brief preliminary note the author calls attention to the occurrence in tubercles on the roots of *Poa annua* and other grasses of a slime fungus allied to *Sorosphæra junci*, for which the name *S. graminis* n. sp. is proposed. A detailed account of its life history and cytology will be published later.

The rusts of white and red clover, F. D. KERN (*Phytopathology, 1 (1911), No. 1, pp. 3–6*).—The author claims that the white clover rust is autœcious and is the species originally described as *Puccinia trifolii.* It therefore should be known as *Uromyces trifolii*, while *U. fallens* (based on *Uredo fallens*) is proposed as the proper designaton for the common red clover rust, the æcidial stage of which is as yet unknown.

Blackleg or Phoma wilt of cabbage, T. F. MANNS (*Phytopathology, 1 (1911), No. 1, pp. 28–31, pls. 2*).—Previously reported from another source (E. S. R., 24, p. 348).

Lime and artificial fertilizers as a remedy for club root disease, F. K. RAVN (*Tidsskr. Landbr. Planteavl, 17 (1910), No. 1, pp. 163–177*).—Lime was found to have a decidedly favorable influence on the root crop in the 8 series of experiments conducted, increasing the yields and decreasing the percentage of diseased plants. The artificial fertilizers, on the other hand, were found to increase the percentage of diseased roots, doubtless due to the application of large quantities of superphosphates.

Report of investigations concerning rice, J. S. COLLIER (*Stuttgart, Ark., 1910, pp. 28, figs. 11*).—In this publication, which is issued by the Arkansas Rice Growers' Association, the author reports the results of a summer's observation on rice growing, special attention being given to rice blight and its probable causes, and to rice maggot.

The probable relationships of the following factors to blight were investigated: Soil acidity, soil constituents, temperature, content and temperature of irrigation water, shade, depth of water, wind, rain, sunshine, and the rice maggot. As a result of these investigations the author concludes that the blight found in the Grand Prairie region is not caused by a fungus, but is due to the soil and water. It was found that new soil was more subject to blight than old, and that the use of fertilizers was of no value in combating the disease, while chemical analyses of rain water indicated that it would cause blight much more readily than well water, especially on new soil, and that rice on acid soils blighted more severely than on nonacid soils. No relationship was found to exist between the rice maggot and blight. Fall plowing, thorough spring preparation of the seed bed, and shallow seed planting, followed by an early rolling of the soil and drying the soil for from 3 to 5 days when the rice was about 30 in. high, tended to decrease the amount of blight.

Obsevations on rice maggot have been previously noted (E. S. R., 24, p. 661). The pamphlet closes with a summary of 361 answers received to questions sent out to rice growers in regard to the preparation of rice lands, seeding, irrigation of crops, prevalence of maggots and blight, crop rotation, and similar points.

Floret sterility of wheats in the Southwest, E. C. JOHNSON (*Phytopathology, 1 (1911), No. 1, pp. 18–27*).—Previously reported from another source (E. S. R., 23, p. 451).

Observations on the wintering-over of plant parasites, L. HECKE (*Naturw. Ztschr. Forst u. Landw., 9 (1911), No. 1, pp. 44–53*).—A special study was made of the wintering-over of the uredospore stage of the yellow rust of wheat (*Puccinia glumarum*), in which the results of fall infection with uredospores are given.

Series of pot plants were inoculated during October, November, and December; part of each series was then placed in a greenhouse, and another set in the open air, and the resulting infection tabulated for the months of November, December, January, and March. It was found that the incubation period was lengthened as the temperature fell until it reached a duration of 5 months. Plants inoculated on October 28, November 21, and December 18, and kept in the open air did not produce uredosori until March 28 of the following year.

The author, therefore, believes it entirely possible for the uredospore mycelium to winter over in the tissues of the host, without any external evidence, until an optimum of temperature has been reached in the spring, when uredosori will appear. A table is given showing the maximum, minimum, and average temperatures and the frost periods for the months of October, November, and December, 1908, and for January, February, and March, 1909.

After discussing the possibility of direct teleutospore infection on the wheat, and of infection by means of seed according to the mycoplasm theory of Ericksson, the author concludes that no authentic experimental proofs of such infection have yet been offered.

Crown gall of plants, E. F. SMITH (*Phytopathology, 1 (1911), No. 1, pp. 7–11, pls. 2*).—In a brief preliminary note on this disease the author claims that there is no evidence to show that fungi, myxomycetes, mites, frost, and nutrition disturbances produce this disease, but that it is undoubtedly due to bacteria (*Bacterium tumefaciens*), as shown by inoculation experiments conducted during the past 6 years. During this time successful inoculations were obtained from pure cultures and subcultures on more than 1,000 plants.

A bulletin containing details as to experiments, etc., is in preparation.

Cedar apples and apples, F. E. LLOYD and C. S. RIDGWAY (*Bul. Agr. Dept. [Ala.] No. 39, 1911, pp. 19, figs. 12*).—In a general discussion of the cedar apple fungus, the authors claim that several crops of sporidia may be produced in a given season, (1) by the germination of some teleutospores which failed to become active when the sori swelled, (2) by the swelling of sori which were immature at the time of the first rains, or (3) by the secondary growth of a sorus after it has once become gelatinous and then dried. In the third case, the part of the sorus exposed beyond the tissues of the gall swelled when wet by rain, but the sorus was not completely developed and continued to push out from the gall, which with the next rain swelled and produced sporidia.

The spermogonia (pycnia) were found to secrete and exude a large amount of nectar which attracted bees and other insects, thereby disseminating the pycnospores. It is also claimed that in dry weather the divisions of the pseudoperidium of the æcidia are straight or bent outward, permitting the spores to escape, but that when the atmosphere becomes moist these peridial strips curl inward, closing the opening of the æcidial tube and preventing the escape of the spores. Later, on drying, these strips are again straightened out, carrying some of the æcidiospores on their tips, thus setting them free. In a few instances, fresh outgrowths from a point near the base of matured galls which have just finished bearing sori may occur. These outgrowths remain alive and form galls the succeeding year.

A list is appended of varieties of apples which are resistant or susceptible to this disease.

A new fruit spot of apple, W. M. SCOTT (*Phytopathology, 1 (1911), No. 1, pp. 32–34*).—Attention is called to a fruit spot of apples, especially of the Jonathan and Esopus varieties, which develops almost entirely after the fruit is picked and while in temporary cellar storage, en route to market, or after removal from cold storage. The spots, which are usually distributed promiscuously over the surface of the apple, are dark brown in color, usually circular in outline, from $\frac{1}{4}$ to $\frac{1}{8}$ in. or less in diameter, and slightly sunken, with a lenticel in the center of each spot. The disease has been observed on apples from Iowa, Missouri, Virginia, New York, Oregon, and Washington.

The cause of the trouble is not certainly known, but there is a strong suspicion of injury by arsenate of lead used in spraying. Low temperatures retard or prevent its development, and the trouble may be partly avoided by placing the fruit in cold storage as soon after picking as possible. See also a note by O'Gara on page 759.

Maine apple diseases, W. J. MORSE and C. E. LEWIS (*Maine Sta. Bul. 185, pp. 337–392, pls. 16*).—This is a discussion of the diseases, both parasitic and nonparasitic, to which the apple orchards of Maine are subject, including rather extended descriptions of the symptoms, range, methods of dissemination, and means of combating those which are the most common and dangerous.

Under the nonparasitic group, the authors describe: Winter, crotch, frost, hail, and spray injuries, leaf spot, Baldwin spot, stag horn, and lichens on the trees. Of the parasitic diseases, the following are discussed: Scab, Cylindrosporium fruit spot, sooty blotch, and fly speck of the fruit, Sphæropsis leaf spot, powdery mildew, Penicillium or blue mold, and bitter, brown, and pink rots; Alternaria, Botrytis, Phoma, Hypochnus, Fusarium, Verticillium, Endomyces, and Rhizopus decays; canker and twig blight, and Sphæropsis, bitter rot, Myxosporium, Coryneum, Phoma, Cytospora, and pear blight cankers, and crown gall and wood-destroying fungi. Under orchard sanitation, sprays, and spraying, the authors enumerate the different kinds of sprays to be used, their preparation, and methods of application, including Bordeaux mixture, and self-boiled, home-boiled, and commercial lime-sulphur sprays.

Spraying experiments with a lime-sulphur summer wash, E. S. SALMON (*Jour. Bd. Agr. [London], 17 (1911), No. 11, pp. 881–891*).—The results are reported of experiments with different strengths of home-boiled lime-sulphur mixtures in regard to foliage injury to certain varieties of apples and gooseberries. It was found that late summer spraying with this mixture caused more or less leaf scorching and leaf fall on certain varieties, the amount of injury depending upon the strength of the solution used and the variety of apple or gooseberry sprayed.

Use of self-boiled lime sulphur in combating scab and brown rot of peach, H. W. BARRE (*South Carolina Sta. Rpt. 1910, pp. 27, 28*).—The results are reported of experiments in which 2 applications of self-boiled lime-sulphur mixture (8:8:50) were used on Carmine and Belle of Georgia peaches, and a third on Elberta. The lime-sulphur spray proved very successful in controlling the brown rot, but was not quite so efficient with the scab, due, it is thought, to not thoroughly covering the surface of the fruit with the spray mixture.

Brown rot experiments in 1909, A. C. LEWIS (*Ga. Bd. Ent. Bul. 32, 1910, pp. 35–43, fig. 1*).—The results are given of experiments with self-boiled lime-sulphur mixtures with and without arsenate of lead, with concentrated lime sulphur, and with Bordeaux mixture.

All the solutions used, with the exception of the self-boiled lime-sulphur and arsenate of lead sprays, severely injured the trees. Three applications were made on the lime-sulphur plats. The first consisted of arsenate of lead and lime, 2:3:50, and the other two were lime-sulphur and arsenate of lead sprays, 8:8:2:50. The self-boiled lime-sulphur sprays did not injure the fruit or the foliage and protected the trees against scab, brown rot, and curculio, while the sprayed fruit had a better color and kept better in storage and in shipping.

On the means for combating plant diseases, K. MÜLLER (*Ber. Grossh. Bad. Landw. Vers. Anst. Augustenb., 1909, pp. 108–115*).—Experiments made during

1910 with a new sulphur emulsion known as "Sulfabion" in combating the grape Oïdium gave negative results.

Diseases of the pineapple, L. D. LARSEN (*Hawaiian Sugar Planters' Sta., Path. and Physiol. Bul. 10, pp. 9–70, figs. 26*).—Descriptions are given of the common diseases of the pineapple which occur in Hawaii, together with the results of experiments on several of the more injurious, descriptions of the causative organisms, and methods of control.

The author claims that the most prevalent and destructive parasite connected with the pathology of pineapples is *Thielaviopsis paradoxa* (*T. ethaceticus*). In a general study of this fungus it was found that sunlight was very destructive to both its mycelium and spores. An exposure of 24 hours during the summer to the direct sunlight destroyed both the spores and mycelium, but during the fall and winter the results were less pronounced. Successful cross-inoculations were made with pure cultures of the sugar cane and pineapple Thielaviopsis on both sugar cane and pineapples, thus proving the identity of these organisms.

In a study of diseased pineapple tissues, 4 organisms were repeatedly found, viz, *T. paradoxa*, *Fusarium* sp., *Eurotium* sp., and a yeast-like organism designated as Culture No. 26. Inoculation experiments with pure cultures of these 4 organisms showed that *T. paradoxa* was the cause of 3 distinct pineapple diseases, viz, a soft rot of the fruit, a base rot of the crown, and a leaf spot in which the infection occurs through wounds. The Fusarium produced a brown rot which occurs usually on the ripening fruit, while the yeast-like organism 26 probably causes a ripe rot which is always characterized by the odor of alcoholic fermentation. It was found that the Thielaviopsis fungus was capable of infecting perfectly sound, unbruised pineapples, provided moist atmospheric conditions prevailed, and that it attacked green pineapples quite as readily as ripe ones. In the base rot of the crown, the newly planted cuttings are attacked just at the ground by the fungus, producing a soft rot which often kills the affected plant.

In addition to the above described diseases, the author discusses sun scald, wilt (the cause of which is as yet unknown), tangleroot, nematode root galls, and manganese yellows (E. S. R., 21, p. 139), all of which occur in Hawaii, and spike, sanding, and heart rot or bitter heart, which have not yet been found on the islands.

A study on gummosis of Prunus and Citrus, with observations on squamosis and exanthema of the Citrus, O. BUTLER (*Ann. Bot.* [*London*], *25* (*1911*), *No. 97, pp. 107–153, pls. 4, figs. 3*).—The author reports the results of investigations on the nature and cause of gummosis, in which the history and description of the disease, the chemistry of the gums, and the histology, cause, nature, and preventive and remedial measures for gummosis are discussed.

As a result of these investigations the author claims that the gummosis of Prunus and Citrus are indistinguishable diseases and identical in histological development and causal relationships. The disease is claimed to be due to hydrolysis of the walls of the embryonic wood cells which develop into a susceptible tissue. The dissolution of the cell walls begins in the secondary lamella and almost coincidently in the primary membrane, while the dissolution of the third lamella proceeds centripetally. With its final destruction the cell contents become a part of the gum mass. The cell contents are not actively concerned, nor does starch play any rôle whatever in gum formation. Gummosis develops autogenously, and is induced by all manner of traumatisms, provided they act as growth stimulants to the cambium. Once incited, the simultaneous concurrence of two conditions, one physiological and the other environmental, is necessary for the development of the disease. The cambium must be actively growing, and an abundant supply of water must be available to the roots; either factor alone is inoperative.

On the basis of a study of gummosis, the author suggests as preventive and remedial measures proper drainage, the use of resistant stocks, moderate root pruning, slitting the bark of the diseased trees, and amendments to the soil in the shape of lime and salt.

After a similar study of squamosis and exanthema, the author concludes that the former is a species of gummosis, and consequently that growth and water are factors in its development, while exanthema is only differentiated from gummosis by the erumpent pustules, and can, therefore, probably be considered as only another form of gummosis.

A bibliography is appended.

Withertip of citrus trees, E. O. ESSIG (*Pomona Col. Jour. Econ. Bot., 1 (1911), No. 1, pp. 25–56, figs. 8*).—The history and distribution of this disease in citrus orchards is given, together with a description of its characters and destructiveness and the methods used in combating it.

Attention is called to several local attacks of this fungus (*Colletotrichum glœosporioides*) on lemon and orange trees on the Pacific slope during 1909–10, especially in Ventura County, California, where serious losses have resulted to citrus growers from this disease, which seems to be increasing in frequency and severity. The results are also given of experiments on the control of this disease by the use of lime-sulphur and Bordeaux-mixture sprays. The best spray for this purpose is found to be a 4 : 4 : 50 Bordeaux mixture. The history and control of this disease in the Limoneira orchard is presented by J. D. Culbertson.

A new coffee disease (Phthora vastatrix), F. H. D'HERELLE (*An. Mus. Nac. [San Salvador], 4 (1910), No. 28, pp. 182–189*).—This is a summary of investigations previously noted from other sources (E. S. R., 23, p. 749) on the life history of this fungus, which the author has described as a new genus and species.

Two new fig diseases, C. W. EDGERTON (*Phytopathology, 1 (1911), No. 1, p. 12–17, pl. 1, fig. 1*).—The author describes a fig canker in which the tissue surrounding a fruit scar turns dark and shrinks, often showing a number of pink pustules. The diseased area spreads until the branch is nearly girdled, when the twig usually dies. In old cankers on branches 2 or 3 in. in diameter the dead tissue cracks and finally falls out, leaving an open permanent wound, which sometimes extends nearly to the center of the branch. Infection seems to occur only in the fruit scar and within less than a year after the development of the fruit. The fungus producing the canker is described as a new species, *Tubercularia fici*.

The second disease discussed is a limb blight of the fig tree, which is characterized by bright, salmon-colored fructifications on the branches and by the sudden wilting and dying of the leaves on infected areas. The fungus (*Corticium lætum*) generally gains a foothold in the tips of branches which have been killed by the fig canker or by fig borers and spreads from there into the living tissue.

On a parasitic fungus of the oak, G. ARNAUD (*Ann. École Nat. Agr. Montpellier, n. ser., 9 (1910), No. 4, pp. 278–286, pl. 1*).—A description is given of *Trabutia quercina*, a parasite on the leaves of *Quercus ilex* and *Q. coccifera*, which, the author claims, from its perithecial characters must belong to the Pyrenomycetes.

The oak mildew, its dissemination in Austria-Hungary, and its significance in silviculture, G. KÖCK (*Ztschr. Landw. Versuchsw. Österr., 13 (1910), No. 2, pp. 842–888*).—It is claimed that this mildew is generally prevalent in all the forests throughout this region where oaks are present. It appeared for the first time in 1908, followed in 1909 by serious outbreaks. Under natural forest conditions *Quercus cerris* is more resistant to the disease than *Q. pedunculata* and *Q. sessiliflora*, while *Q. rubra* is extremely resistant, as are all the cultivated American species, even when in the same gardens with native European oaks which are severely attacked by the mildew.

In some cases the smaller twigs and branches were killed by the attack, in addition to a general lowering of the vitality of the tree due to leaf fall. The disease is attributed to *Oïdium quercinum gemmiparum*.

A bibliography is appended.

On outbreaks of oak mildews, P. MAGNUS (*Vereinsschr. Gesell. Luxemb. Naturfr., 1910, pp. 108–111; abs. in Centbl. Bakt.* [etc.], *2. Abt., 29 (1911), No. 4–5, p. 114*).—It is claimed that the mildew epidemic on the European oaks in 1907 was caused by a Microsphæra, probably *M. quercina*, while the mildew in western France on *Quercus tozza* was probably a form of *M. alni*, which developed only the Oïdium fructifications on the European oak.

Willow trees killed by Armillaria mellea, F. T. BROOKS (*Gard. Chron., 3. ser., 49 (1911), No. 1260, pp. 100, 101*).—Attention is called to the occurrence of this fungus on the roots of a species of willow (*Salix alba*), causing the sudden death of many of the trees. In England the fungus is rarely found on dicotyls, but is often very destructive to conifers. Ash trees which have been planted among the willows seem to be immune to the disease, and the replacement of the willows by ash is therefore recommended.

The diseases and enemies of roses, R. LAUBERT and M. SCHWARTZ (*Rosenkrankheiten und Rosenfeinde. Jena, 1910, pp. VI+59, pl. 1*).—Under this title the authors list and discuss the principal diseases and insect enemies of the rose, including directions for the control of each.

Notes on the free-living nematodes, F. A. POTTS (*Quart. Jour. Micros. Sci.* [*London*], *n. ser., 55 (1910), No. 219, pp. 433–484, figs. 11; abs. in Zentbl. Allg. u. Expt. Biol., 1 (1910), No. 15–16, pp. 563, 564*).—Biological studies are reported.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

The farmer's interest in game protection, E. H. FORBUSH (*Agr. of Mass., 57 (1909), pp. 273–279*).—The author briefly considers the value of game birds and mammals, the financial benefits derived from game, and its artificial propagation.

Plague amoung ground squirrels in America, G. W. MCCOY (*Jour. Hyg.* [*Cambridge*], *10 (1910), No. 4, pp. 589–601, pls. 2, map 1*).—A table accompanying this brief summarized account shows the number and results of examinations made of ground squirrels collected in 25 counties in California. A map gives the area from which examinations of squirrels have been made, and the approximate location of infected points.

An outbreak of rat plague in Suffolk, A. M. N. PRINGLE (*Pub. Health* [*London*], *24 (1911), No. 4, pp. 126–131*).—This is a detailed account of the occurrence of plague in England as previously noted (E. S. R., 24, p. 556).

It has now been conclusively shown that over a large area of a part of East Suffolk rats are at the present time dying of acute plague. "In addition hares have been found to have died of the disease in the same districts. Many dead rabbits have been found, but up to the present plague has been found in only one case, the other rabbit deaths being due to other diseases which investigation would show to be common at this period of the year in any case. One cat has also been found infected and several ferrets. . . . Apart from the rats the infection of other animals must be regarded as an accidental concomitant of the rat epizootic."

A summary of the evidence as to the existence of plague among human beings in the affected parts of Suffolk show that "there were 4 cases of true pneumonic plague in Holbrook in 1910, 8 cases of practically certain pneumonic plague in Shotley in 1906 and 1907, and 7 cases of possible bubonic plague in Trimley in 1909 and 1910." It is said that the rat flea of Suffolk is *Cerato phyllus fasciatus.* The means by which the disease was introduced into this district is unknown; the various theories which have been advanced are presented at some length.

Investigations of "Liverpoolvirus," a rat-destroying preparation, K. STEFFENHAGEN (*Arb. K. Gsndhtsamt., 36 (1910), No. 2, pp. 198–220*).—The cultural and biological studies here reported are accompanied by a bibliography of 32 titles.

Publications of the Bureau of Entomology (*U. S. Dept. Agr., Div. Pubs. Circ. 16, pp. 9*).—A list of publications of the Bureau of Entomology that are available for free distribution by the Division of Publications of this Department.

Entomology, A. W. MORRILL (*Arizona Sta. Rpt. 1910, pp. 390–392*).—The author reports that insect pests are fast assuming in Arizona the important status they have long maintained in California. The woolly aphis has established itself in Graham and Yavapai county apple orchards, where it was introduced several years ago.

The large red harvester ant (*Pogonomyrmex* sp.) is one of the most destructive insect pests in the Territory, the areas made bare in alfalfa fields by this insect in some sections amounting to 5 or 10 per cent of the total acreage, and being estimated at 2 per cent throughout the Salt River Valley. The harvester ants also occasionally defoliate young citrus trees and gnaw the bark, causing the destruction of the trees attacked unless they are promptly suppressed.

Experiments conducted have shown carbon bisulphid to be too expensive for general use against these insects in alfalfa fields. Potassium cyanid dissolved in water and used at the rate of 1 oz. to 1 gal. of water is the cheapest and best method for immediately checking them, but this treatment can not be relied upon to eradicate them completely. London purple, although slow acting, is stated to be the cheapest and most satisfactory insecticide of the many tested; it should be applied at intervals in powder form at the rate of 1 tablespoonful scattered around the opening to each nest.

Examinations of oranges were made in December, 1909 to determine the injury caused by the citrus thrips (*Euthrips citri*). Of 100 navels selected at random from the field boxes from each of 10 representative groves it was found that an average of 25 per cent was so scarred that it should properly be classed as second grade. The injury ranged in different groves from 3 to 57 per cent.

Tenth report of the state entomologist of Connecticut for the year 1910, W. E. BRITTON (*Connecticut State Sta. Rpt. 1909–10, pt. 9, pp. VI+657–712, pls. 8, figs. 14*).—The entomological features of 1910 are briefly considered, including reports of the inspection of nurseries, imported nursery stock, and apiaries, and of the gipsy moth work.

During the work 8,234 gipsy moth egg masses and 8,936 caterpillars at burlap bands were destroyed at Wallingford, where the area actually infested with the moth is estimated at 0.378 of a square mile. During the season a tachinid parasite (*Tachina mella*), which has previously been recorded as parasitic on the gipsy moth in Massachusetts was bred at Wallingford. At Stonington but 1 egg mass and 146 caterpillars were found and destroyed. A brief account is given of the brown-tail moth and its occurrence in Connecticut as previously noted (E. S. R., 24, p. 455).

Tests made of several proprietary insecticides in destroying the rosy apple aphis and the San José scale are reported by B. H. Walden, who also presents a paper on a phorid (*Aphiochæta rufipes*) infesting onion seed. The small maggots of this fly were taken from onion seeds which had been placed in a germinator to test their vitality. The maggots were first observed in 3 or 4 days, or soon after the seeds began to sprout. "They soon ate out the interior of the seeds and were present in such numbers that it was impossible to obtain any data regarding the vitality of the seeds. Spinach and grass seeds which were in the germinator were not attacked, so the first supposition was that the onion seeds were infested when put in to test." A number of the larvæ pupated in about 10 days from the time the seeds were first placed in the germinator, the first adult emerging on November 21, 24 days after the pupæ were first observed. Technical descriptions are given of the stages.

A pyralid caterpillar taken April 12 on nursery stock imported from Japan has been identified as *Hemiscopis cinerea*. Brief descriptions of the larva, pupa, and adult are included.

Notes are presented on injury to cartridge shells by ants. Cardboard shells and in some cases the wads of a box of paper shotgun cartridges returned to the manufacturers from Texas had been eaten so that the powder and shot fell out and mixed together. The injuries indicated that the insects used the box of shells as a nesting place rather than a source of food. The author is of the opinion that this injury may have been caused by the Argentine ant (*Iridomyrmex humilis*).

Other insects briefly considered are the pear-leaf blister mite; *Bucculatrix canadensisella*, which infested birch trees as previously noted (E. S. R., 24, p. 455); the 15-spotted lady beetle (*Anatis 15-punctata*) observed feeding on *Calipterus betulæcolens;* the cabbage looper; the cottonwood leaf beetle (*Lina scripta*); the red cedar bark beetle (*Phlœosinus dentatus*), which attacked Arbor vitæ; the maple leaf stem borer (*Priophorus acericaulis*); the rhododendron lace bug (*Leptobyrsa explanata*), which in some cases caused rather serious injury to rhododendrons; the grape fruit worm; June beetles (*Lachnosterna* sp.), which defoliated poplars; the clover seed chalcid fly; caterpillars on fir (*Abies tomomi*) from Japan; the currant spanworm (*Cymatophora ribearia*); the cluster fly (*Pollenia rudis*); the Mocha stone moth (*Melalopha inclusa*), which was abundant on poplar and willow; the fern scale on greenhouse ferns; caterpillars feeding on Japanese barberry (*Berberis thunbergi*); the drone fly (*Eristalis tenax*); thysanurids (*Isotoma* [*Folsomia*] *fimetaria*) in ginseng seeds; and spring tails (*Isotoma* sp.) in tobacco beds.

Four insect pests (*Maine Sta. Doc. 401, pp. 24, figs. 10*).—Articles are presented on The Typhoid Fly and Its Allies and Flea Beetles and Early Blight of Potatoes, by O. A. Johannsen, and on Plant Lice of the Apple in Maine, and Cutworms in Maine, by Edith M. Patch.

Insect pests in the West Indies in 1910 (*Agr. News* [*Barbados*], *9* (*1910*), *No. 226, p. 410*).—A brief account based on information furnished by the agricultural officers in the several islands of the Lesser Antilles.

Insect pests in South Africa, C. W. MALLY (*Reprint from Agr. So. Africa, 1910, Sept. 23, pp. 12, figs. 6*).—A summarized account of several of the more important insects, including the fruit fly, cutworms, and stalk borer (*Sesamia fusca*), with remedial measures applicable.

Injurious insects of Formosa, T. SHIRAKI (*Agr. Expt. Sta. Formosa*, [*1910*], *vol. 1, pp. 374, pls. 51*).—This work by the entomologist of the Formosa government agricultural experiment station gives in Latin the scientific names of the insects that are illustrated in colors and described in Japanese.

Entomological notes, E. E. GREEN (*Trop. Agr. and Mag. Ceylon Agr. Soc., 35 (1910), No. 3, pp. 221–223, pl. 1*).—Brief notes are presented on the African snail (*Achatina fulica*), *Clerus formicarius*, a root-borer of Para rubber, a mealy bug on cotton plants (*Dactylopius virgatus*), nettle grub on tea (*Natada nararia*), another scale pest of castilloa trees (*Lecanium oleæ*), and the mango weevil (*Cryptorhynchus mangiferæ*).

List of names used in India for common insects, H. M. LEFROY (*Agr. Research Inst. Pusa [India], Bul. 19, 1910, pp. IV+49+XVII*).—This list gives the vernacular, scientific, and English names and the habitat of a large number of the insects destructive to crops in India.

Two insects affecting wheat and barley crops, F. ENOCK (*Jour. Roy. Hort. Soc. [London], 36 (1910), No. 2, pp. 323–330, figs. 5*).—A brief account is given of the life history of the Hessian fly as worked out by the author at Revells Hall, England. Notes are then presented upon a cecidomyid pest that seriously injured wheat and barley at Tenby, in 1908, which has been identified as *Clinodiplosis equestris*. The larvæ were found between the joints, underneath the leaf sheath, each in a cavity in the stalk $\frac{3}{16}$ in. in length.

Can mill insects in any stage pass uninjured through the process of milling? G. A. DEAN (*Oper. Miller, 16 (1911), No. 2, p. 119, fig. 1*).—From experiments conducted in which *Tribolium confusum* and *Silvanus surinamensis* were used, the author concludes that "no egg or larva of the common mill insects can pass uninjured through the rolls or the grinding process in the production of the common brands of flour. No egg or larva of the common mill insects can pass through the meshes of silk bolting cloth of sizes not less than No. 10 XX."

A preliminary report on insects affecting maize in Southern Nigeria, C. W. JEMMETT (*Lagos [South. Nigeria]: Govt., 1910, pp. 4, pl. 1*).—The insects mentioned are *Calandra oryzæ*, *C. granaria*, and lepidopterous larvæ.

A preliminary report on grape insects, F. Z. HARTZELL (*New York State Sta. Bul. 331, pp. 485–581, pls. 15, figs. 8*).—In this bulletin the author presents a report of the entomological work conducted since June 10, 1909, in connection with the Chautauqua County grape investigations. Particular attention has been given to 5 of the more important pests, namely, the grape flea-beetle, grape-blossom midge (*Contarinia johnsoni*), rose-chafer, grape root-worm, and grape leaf-hopper. The economic importance, history, origin and distribution, food plants, character and extent of injury, description of the insect, seasonal history, summary of the life history, and control measures for each of these species are dealt with.

"The grape flea-beetle is a small, steel-blue beetle which feeds on the swelling buds. The beetles appear during April and feed during the warmer days. Mating takes place during a period of nearly 2 months. Egg-laying extends over a period of nearly $2\frac{1}{2}$ months, but the greatest number of eggs are laid during a month and a half extending from about May 1 to the middle of June. The eggs are laid in the canes of the grape. The number of eggs laid by a female was found to vary from 5 to 103. The eggs hatch the latter part of June and early July and the larvæ feed upon the foliage, reaching full development in about 3 weeks. The larvæ form cells in the ground and transform to pupæ in about 3 weeks. The adult beetles feed on the grape foliage and later in the fall seek sheltered places to hibernate. The most efficient spraying mixture is composed of 8 lbs. of arsenate of lead, 3 gal. of glucose, and 100 gal. of water. This is applied in the spring as the beetles are feeding on the vines. The use of the same spray will kill the larvæ if applied the first part of July.

"The grape-blossom midge is found in Chautauqua County, especially on early varieties of grapes. The adult midges emerge from the soil during the latter part of May and the first week in June. They mate soon after emergence and egg-laying begins. The females deposit the eggs in the blossom buds and soon perish. The eggs hatch in a few days and the larvæ feed on the pistil of the blossom bud. The work of the larvæ prevents the development of the buds and thus such injured buds do not produce any fruit. The feeding of the larvæ causes the buds to have an enlarged appearance and to become red in color. The larvæ feed about 2 weeks and then pass from the buds to the soil where they remain until the following spring. These larvæ form hibernating cocoons. Pupæ were found the first part of May. The pupal stage is at least 3 weeks in length. The use of a nicotin preparation as a spray was found to diminish the number of eggs laid. . . .

"Experiments were made with various insecticides to kill the rose-chafer and a mixture consisting of 10 lbs. of arsenate of lead, 25 lbs. of glucose, and 100 gal. of water was found to be very effective in killing the insects. The net gain per acre over the unsprayed grapes was $61.84. Experiments proved that the numbers of the rose-chafer could be materially reduced by cultivating the soil when the insects are in the pupal stage.

The grape root-worm is the most serious insect pest of grapes in Chautauqua County. . . . The most efficient method of controlling this insect is to spray the vines with an arsenical poison, preferably arsenate of lead, when the beetles are feeding. This is usually combined with Bordeaux mixture. Experiments during 1910 appear to show that the use of a gallon of molasses, 6 lbs. of arsenate of lead, and 100 gal. of water is a very effective treatment.

"The experiments with the grape leaf-hopper have shown that the nymphs are very easily killed by the use of a nicotin preparation, guaranteed to contain 2.7 per cent nicotin, and diluted with 65 to 100 parts of water. Lime-sulphur solution as dilute as 1 gal. to 100 gal. of water proved very effective against the leaf-hopper nymphs but it generally caused much injury to grape foliage and the fruit."

Commercial lime-sulphur solution, when used as a repellent for the grape blossom midge in dilutions ranging from 1–40 to 1–60, severely injured the foliage.

[Olive insects] (*Bul. Dir. Agr. Com. et Colon. [Tunis], 14 (1910), No. 56, pp. 296–345, figs. 7*).—Several papers relating to insect enemies of the olive and their control are here presented, as follows: Combating the Principal Olive Pests, by Chapelle (pp. 296–312); Treatment for *Lecanium oleæ* and a Fungus Disease due to *Cycloconium oleaginum*, by E. Zacharewicz (pp. 315–318); Insects and Diseases of the Olive, by N. Minangoin (pp. 319–336); and *Lecanium oleæ*, by Morizot (pp. 340–345).

Castilla rubber pests in Mexico, D. L. CRAWFORD (*Amer. Rev. Trop. Agr., 1 (1910), No. 8–9, pp. 241–247*).—A brief account of observations of the insect pests of *Castilla elastica* in Mexico.

Insects destructive to Canadian forests, C. G. HEWITT (*Com. Conserv. Canada Rpt., 1 (1910), pp. 142–151*).—An address in which the more important insect pests of Canadian forests are briefly discussed.

The animal enemies of Pinus cembra, C. KELLER (*Mitt. Schweiz. Centralanst. Forstl. Versuchsw., 10 (1910), No. 1, pp. 3–50, figs. 15; abs. in Zentbl. Allg. u. Expt. Biol., 1 (1910), No. 15–16, pp. 552, 553*).—A report of studies of the insect and other animal enemies of cembran pine in the forests of the Swiss Alps.

Insects destructive to books, W. R. REINICK (*Sci. Amer. Sup., 70 (1910), No. 1825 pp. 408–410, figs. 8; Amer. Jour. Pharm., 82 (1910), No. 12, pp.*

550–562).—The author, who has been investigating the subject for a number of years, presents a summary of the facts discovered and collected.

Contributions to a knowledge of the Odonata of the Neotropical Region, exclusive of Mexico and Central America, P. P. Calvert (*Ann. Carnegie Mus., 6 (1909), No. 1, pp. 73–280, pls. 9*).—Two hundred and thirty-one species are noted, of which many are described as new.

Termites and living plants, J. Chaine (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 22, pp. 1087, 1088; 69 (1910), No. 33, pp. 446–448*).—The fourth article of this series (E. S. R., 24, p. 56) deals with the effect of the termites' attack upon the plant, the fifth with the beginning of the invasion.

Observations on nearctic Capsidæ with descriptions of new species, O. M. Reuter (*Acta Soc. Sci. Fennicæ, 36 (1909), No. 2, pp. 86+III*).—Descriptions of a large number of new species are included in this account.

On the life history of Trioza camphoræ n. sp. of camphor tree and its injuries, C. Sasaki (*Jour. Col. Agr. Imp. Univ. Tokyo, 2 (1910), No. 5, pp. 277–286, pls. 2*).—This psyllid occurs in swarms on camphor trees and is the source of considerable injury through the falling off of infested leaves. It is usually found on the camphor trees grown in the main island of Japan, Shikoku, and Kiushu, as well as in Formosa, South China, etc.

The characteristics and developmental history of the hemipterous fauna of palearctic conifers, O. M. Reuter (*Acta Soc. Sci. Fennicæ, 36 (1909), No. 1, pp. 129*).—This work includes an annotated list of 304 species, and an extensive bibliography of the literature relating to the Heteroptera, Auchenorrhynchia and Psyllidæ on palearctic conifers.

Interim report on froghoppers, F. W. Urich (*Bul. Dept. Agr. Trinidad, 9 (1910), No. 66, pp. 177–182*).—This account of the natural history and methods of control of froghoppers includes a bibliography of cane blight and froghoppers.

Identification of the sugar cane froghopper, F. W. Urich (*Proc. Agr. Soc. Trinidad and Tobago, 10 (1910), No. 12, pp. 525–527*).—It is stated that examinations made by E. D. Ball have shown the sugar cane froghopper to be *Tomaspis varia*. While *T. postica* was taken on sugar cane in Mexico, it is quite different from the species injuring sugar cane in Trinidad. Three additional species of Tomaspis are listed from the island.

Notes on the biology of the froghopper, L. H. Gough (*Bul. Dept. Agr. Trinidad, 9 (1910), No. 66, pp. 174–176*).—A preliminary account of the life history studies of the sugar cane froghopper.

On spraying for froghoppers, L. H. Gough (*Dept. Agr. [Trinidad], Circ. 5 [1910], pp. 4, pl. 1*).—The author finds that the control of the sugar cane froghopper by means of sprays must be limited to fighting the adults as the nymphs are protected by their froth or are underground and inaccessible. A mechanically mixed kerosene and water solution is thought to be the most effective spray.

The froghopper fungus, J. B. Rorer (*Bul. Dept. Agr. Trinidad, 9 (1910), No. 66, pp. 182–184; abs. in Agr. News [Barbados], 9 (1910), No. 222, pp. 350, 351*).—A brief account of results of investigations of the entomophthorous fungus that attacks the sugar cane froghopper. The fungus concerned is thought to be a species of Oospora.

The green muscardine of froghoppers, J. B. Rorer (*Proc. Agr. Soc. Trinidad and Tobago, 10 (1910), No. 11, pp. 467–482, pl. 1; abs. in Agr. News [Barbados], 10 (1911), No. 230, p. 62*).—The fungus that attacks the sugar cane froghopper in Trinidad has been identified by R. Thaxter as *Metarrhizium anisopliæ*. It is said to be widely distributed and to attack a variety of insects of different orders and in different stages of development. This fungus was first discovered by Metschnikoff in Russia on the larvæ of the wheat cockchafer, *Anisoplia austriaca*. It has since been reported to attack the curculionid beetle *Cleonus punctiventris* and silkworms, and a variety of the fungus has been described by Pettit (E. S. R., 7, p. 412) as attacking cutworms of the genus Agriotes.

A bibliography of 26 titles accompanies the account.

Results of experiments with the froghopper fungus, L. H. GOUGH (*Proc. Agr. Soc. Trinidad and Tobago, 10 (1910), No. 11, pp. 463-465*).—The author reports having found this fungus growing on flies and to have experimentally infected flies and a second species of froghopper that infests Hibiscus.

In the cultural studies here reported it was found that the fungus grows readily on most artificial media. It attacks nymphs and adults with equal readiness. Nymphs infected in the last stage can molt but succumb to the infection as adults. "The period elapsing between infection and death is from 3 to 7 days. The fungus first appears as a white coating on the underside of the abdomen and on the upper and undersides of the thorax. The victim is usually held firmly in place on the cane-leaf or whatever it is sitting on by a felted mass of hyphæ. In experimental cages dead 'fungus' froghoppers are frequently found on the ground."

Two methods of distributing the infection have given successful results. In the first the spores were scraped from potato media and after mixing with flour to increase the bulk were dusted with a powder bellows over the field. In the second the fungus was grown on small chips of potato, and after 14 days' growth the chips were deposited in the angles of top-cane leaves on October 10 and 11.

The froghopper fungus and its practical application, L. H. GOUGH (*Dept. Agr. [Trinidad], Circ. 6, 1910, pp. 6, figs. 2*).—A discussion of the preparation and distribution of the fungus parasite of the sugar cane froghopper as above noted.

Contributions to the biological study of Chermes, P. MARCHAL (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), Nos. 15, pp. 652-654; 17, pp. 732-734; 19, pp. 832-834*).—Biological notes on *Chermes piceæ*, *C. nüsslini*, and *C. pini* are here presented.

Diaspis pentagona and its insect enemies, A. BERLESE (*Redia, 6 (1910), No. 2, pp. 298-345, pl. 1, figs. 11*).—An account of *D. pentagona*, its geographical distribution, food plants, and more important insect enemies.

Notes on the Pediculidæ, L. G. NEUMANN (*Arch. Par., 13 (1910), No. 4, pp. 497-537, figs. 31*).—An account of 18 species of which 7 are described as new.

The diamond-backed cabbage moth (Plutella cruciferarum), W. W. FROGGATT (*Agr. Gaz. N. S. Wales, 21 (1910), No. 10, pp. 894-899, pl. 1, fig. 1*).—An account of the life history, habits, and natural enemies of, and control measures for, *P. cruciferarum*, a pest of world-wide range that is the source of considerable injury to cabbages in Australia.

The coiling of caterpillars of Epichnopteryx helicinella, C. VANEY and A. CONTE (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 10, pp. 432-434; abs. in Jour. Roy. Micros. Soc. [London], 1910, No. 5, p. 570*).— Bionomic notes are presented.

Mealie grubs, C. FULLER (*Natal Agr. Jour., 15 (1910), No. 4, pp. 426-436, pls. 2, figs. 3*).—Notes on the caterpillars of 3 moths, their injury to corn in Natal, and the remedial measures applicable.

A cecidomyiid on mango leaves (*Agr. News [Barbados], 10 (1911), No. 227, p. 10, fig. 1*).—Mention is made of an undetermined species of cecidomyiid fly, the larva of which lives in the soft tissue of mango leaves in the island of St. Vincent.

Mosquitoes of Minnesota, K. TAYLOR (*St. Paul Med. Jour., 12 (1910), No. 7, pp. 329–335*).—The author presents a list of 12 species, representing 6 genera, which were found near St. Paul and Minneapolis and in other parts of the State.

Malaria and anophelines in the valley of the Clear River, at Tuyen-quang and Hagiang, C. MATHIS and M. LEGER (*Bul. Soc. Path. Exot., 3 (1910), No. 9, pp. 632–636*).—The authors have determined the presence of 13 species of anopheline mosquitoes in the vicinity of the Clear River, among which are *Myzomia christophersi*, *Myzorhynchus barbirostris*, *Nyssorhynchus fuliginosus* and *N. stephensi*, species known to transmit the malarial parasite. It is said that in the Tonkin delta where malaria occurs much less frequently *Myzomyia rossi* and *Myzorhynchus sinensis-pseudopictus*, which do not convey malarial infection, are the principal species.

Note on an acid-resistant parasite of the larvæ of Stegomyia fasciata, J. LEGENDRE (*Compt. Rend. Soc. Biol. [Paris], 69 (1910), No. 27, pp. 194–196*).—Under the name *Bacillus acidophilus stegomyiæ*, the author describes an acid-resistant form that he has observed while rearing the yellow fever mosquito. Although occurring but rarely in water in the aquarium, sections made of larvæ and pupæ have shown the alimentary canal to be filled throughout its entire length with this acid-resistant bacillus. The development of the mosquito, however, does not appear to be retarded thereby.

Studies in relation to malaria, S. T. DARLING (*Washington: Isthmian Canal Com., 1910, pp. 38*).—These biological studies of mosquitoes and their relation to the transmission of malaria have been previously noted from another source (E. S. R., 23, p. 561).

Studies upon leprosy.—IX, Mosquitoes in relation to the transmission of leprosy, D. H. CURRIE (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Bul. 39 pp. 3–19*).—The author concludes that "mosquitoes feeding, under natural conditions, upon cases of nodular leprosy so rarely, if every, imbibe the lepra bacillus that we can exclude them as one of the ordinary means of transference of this bacillus from lepers to the skin of healthy persons. This insect is therefore not of epidemiological importance in this disease."

"The reason that mosquitoes that have fed on lepers do not contain the lepra bacilli is that when these insects feed they insert their proboscis directly into a blood vessel and thus obtain bacilli-free blood, unmixed with lymph. The above-mentioned habit alone accounts for the absence of lepra bacilli in mosquitoes that have fed on lepers; the insect neither avoids biting a leprous nodule nor is its digestive tract or the contained fluids capable of altering the morphology of this bacillus in a reasonable length of time."

A bibliography of 29 titles relating to the subject is appended.

A remedy for the black fly pest in certain streams of the southern peninsula of Michigan, CORA D. REEVES (*Rpt. Mich. Acad. Sci., 12 (1910), pp. 77, 78*).—Observations made of *Simulium venustum*, which was a great pest at Douglas Lake, Cheboygan County, Mich., in June, 1909, are recorded. Experiments conducted by the author indicate that the removal from the stream of smooth objects to which the larvæ are attached will greatly lessen the black fly pest.

Some observations on the bionomics of Tabanus ditæniatus and T. kingi, H. H. KING (*Bul. Ent. Research, 1 (1911), No. 4, pp. 265–274, figs. 7*).—A report of investigations conducted at the Wellcome Tropical Research Laboratories at Khartum.

[Flies], C. W. STILES (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 25 (1910), No. 50, pp. 1829, 1830*).—"If fly-blown fecal material is buried under 17 in. of sterilized sand, flies (*Ophrya leucostoma*) will crawl through the sand and complete their development. When fly-blown fecal material was buried under 48 in. of clean (unsterilized) sand, flies (*Musca domestica*) issued from the surface. When fly-blown fecal material was buried under 72 in. of clean (unsterilized) sand, flies (genus and species undetermined) issued from the surface."

Studies upon leprosy.—X, Flies in relation to the transmission of leprosy, D. H. CURRIE (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Bul. 39, pp. 21–42*).—Following an introduction in which the literature is briefly reviewed, transmission experiments with several species of flies found in Honolulu and Kalawao, namely, *Musca domestica*, *Sarcophaga pallinervis*, *S. barbata*, *Volucella obesa*, and an undetermined species of Lucilia are reported.

The conclusions drawn are as follows: "The above named flies, when given an opportunity to feed upon leprous fluids, will contain the bacilli in their intestinal tracts and feces for several days after such feeding. The above fact, together with the well-known habits of these flies, make it certain that, given an exposed leprous ulcer, these insects will frequently convey immense numbers of lepra bacilli, directly or indirectly, to the skins, nasal mucosa, and digestive tracts of healthy persons. Our present state of knowledge does not permit us to determine whether such insect-borne bacilli are or are not capable of infecting persons whose skin and mucosa are thus contaminated; but until we have more accurate knowledge on this point we are justified in regarding these insects with grave suspicion as being one of the means of disseminating leprous infection."

The natural food of Glossina palpalis, D. BRUCE ET AL. (*Proc. Roy. Soc. [London], Ser. B, 82 (1910), No. B 558, pp. 490–497*).—"Two hundred and twenty *G. palpalis* were caught on various parts of the lake shore, and at intervals extending over several months; they were examined about 24 hours after capture. The examination of their intestinal contents revealed the fact that about 27 per cent contained the remains of blood, the majority of which was of mammalian origin. In the second experiment, 183 *G. palpalis* were caught at one spot where the food supply was abundant—birds and crocodiles—and the flies were examined at once. A much higher percentage (nearly 60 per cent) contained the remains of a blood meal. The blood in the majority of the flies had been obtained from birds or reptiles, and of these the reptilian blood was twice as frequent as the blood of birds."

Mechanical transmission of sleeping sickness by the tsetse fly, D. BRUCE ET AL. (*Proc. Roy. Soc. [London], Ser. B, 82 (1910), No. B 558, pp. 498–501*).—"The mechanical transmission of sleeping sickness by means of *Glossina palpalis* can take place if the transference of the flies from the infected to the healthy animal is instantaneous—that is, by interrupted feeding. This mechanical transmission does not take place if an interval of time comes between the feedings. Mechanical transmission plays a much smaller part, if any, in the spread of sleeping sickness than has been supposed."

Flies and vermin, W. H. HAMER (*Ann. Rpt. Med. Off. Health, County London, 18 (1909), App. 4, pp. 9, dgms. 4*).—In part 1 of this report, which is devoted to the fly nuisance, the author deals with the total yield of flies on fly papers, the evidence as to nuisance at particular premises, differences observed in the yield of flies obtained by using different forms of fly traps, the distribution of flies by sexes, and further observations on the relation of the fly to food contamination and to spread of disease, etc. It is said that 2 species of rove beetle, *Pterostichus madidus* and *Calathus cisteloides*, were frequently found and always in conjunction with mutilated flies, and that earwigs have a marked partiality for flies.

In part 2 a statistical record is presented of the results of routine inspection of beds in lodging houses for vermin. Diagrams are given which show the relation in point of time between the prevalance of flies and diarrheal mortality in London during the years 1907–1909, the numbers of flies belonging to 6 principal genera caught in balloons and on papers during the summer of 1909, the seasonal prevalence of 6 principal genera of flies, and the seasonal prevalence of bugs, fleas, and lice.

Progress report of the investigation of pellagra, L. W. Sambon (*Jour. Trop. Med. and Hyg.* [*London*], *13* (*1910*), *Nos. 18, pp. 271–282; 19, pp. 287–300; 20, pp. 305–315; 21, pp. 319–321*).—"The many analogies existing between the epidemiology of pellagra and that of the best known insect-borne diseases; the constant association of the disease with Simulium-infested streams; the absence of any other arthropod with similar distribution that might account for it; the striking correlation between the fly and the disease in wide geographical distribution, peculiar topographical exigencies, extraordinary double season activity, the marked influence of temperature, heavy rains, and inundations; are all facts which strongly point to Simulium as the necessary carrier of pellagra."

Sheep maggot fly in the West, W. W. Froggatt (*Agr. Gaz. N. S. Wales, 21* (*1910*), *No. 10, pp. 890–892*).—A brief report is given of an investigation made in the Trangie district of New South Wales, where this maggot is the source of considerable loss to sheep breeders.

"Our investigations show that the damage is caused by the maggots of the 2 common yellow blowflies (*Calliphora villosa* and *C. oceaniæ*), found in both the house and the bush all the year round. In winter they deposit eggs upon everything they infest, but in summer the eggs are hatched in the body of the fly and living maggots dropped. In no case have I found any species of the bright green or blue metallic flies, so common about dead sheep, to breed out from maggots taken from blown wool from the backs of live sheep. The destruction of all material in which these blowflies deposit their eggs or maggots will be the greatest factor in reducing the sheep maggot fly pest."

Technical results from the gipsy moth parasite laboratory.—Investigations into the habits of certain Sarcophagidæ, T. L. Patterson and W. F. Fiske (*U. S. Dept. Agr., Bur. Ent. Bul. 19, pt. 3, tech. ser., pp. 25–32*).—The authors' experiments here reported "indicate very conclusively that the sarcophagids in New England do not destroy living gipsy-moth larvæ or pupæ in the field. From a collection of 2,666 specimens not a single sarcophagid was reared. In cages the flies would not oviposit on healthy or recently killed caterpillars or pupæ, but did so freely after they became slightly decomposed. First-stage maggots, when placed artificially within living pupæ, failed to develop in every instance, showing that the conditions were not favorable for their growth. When living and decomposing larvæ or pupæ were placed side by side in a cage, the flies selected the latter on which to oviposit, and normal larvæ developed."

On the biology of Oscinis frit, M. Shesterikov (*Izv. Moskov. Selsk. Khoz. Inst.* [*Ann. Inst. Agron. Moscou*], *16* (*1910*), *No. 3, pp. 207–228, figs. 8*).—This is an account of studies made by the author in Russia.

The carrot fly, J. C. Chapais (*Nat. Canad., 37* (*1910*), *No. 6, pp. 84–89*).—An account of *Psila rosæ*, the carrot fly or carrot rust-fly.

Studies of the natural history of Strepsiptera, N. V. Nassonov, trans. by A. v. Sipiagin (*Ber. Naturw. Med. Ver. Innsbruck, 33* (*1910*), *pp. VIII+206, pls. 6, figs. 2*).—This consists of translations from the Russian into German of a number of papers by Nassonov and a supplement by K. Hofeneder.

Concerning a cysticercoid from a jerboa flea, A. Dampf (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 54* (*1910*), *No. 5, pp. 452–454, figs. 2*).—Up to the present time the larva of *Tænia cucumerina*, reported to occur in *Pulex serraticeps* and *P. irritans*, has been the only one known to occur in fleas. The author now describes a cysticercoid found in the abdominal cavity of *Mesopsylla eucta* n. sp., a flea found on the jerboa (*Alactaga jaculus*) of Turkestan and from which tapeworms have not hitherto been recorded. The hooks of this parasite are said to be like those of *Hymenolepis nana*.

Life histories of Indian insects, Coleoptera I, H. M. Lefroy (*Mem. Dept. Agr. India, Ent. Ser., 2 (1910), No. 8, pp. 139–163, pls. 7*).—The beetles here described and figured are *Phyllognathus dionysius, Anomala varians, Galerucella singhara, G. rugosa, Apomecyna pertigera, A. histrio, Cylas formicarius*, and *Cionus hortulanus*.

On the anatomy and biology of the bark beetle genus Cryphalus, O. Nüsslin (*Naturw. Ztschr. Forst u. Landw., 8 (1910), No. 6, pp. 289–298, figs. 5*).—This first paper deals with the female genitalia.

Nuclei for mating queen bees, R. Beuhne (*Jour. Dept. Agr. Victoria, 8 (1910), No. 11, pp. 695–697, fig. 1*).—The ways in which nuclei may be made are here described.

Introduction of the St. Vincent Jack Spaniard into Montserrat (*Agr. News [Barbados], 9 (1910), No. 224, p. 378*).—A brief account of the introduction of *Polistes annularis*, which destroys the cotton worm, into the island of Montserrat.

Synonymic and descriptive notes on the chalcidoid family Mymaridæ, A. A. Girault (*Jour. N. Y. Ent. Soc., 18 (1910), No. 4, pp. 233–259, fig. 1*).—Descriptions of a genus (Macrocamptoptera) and 3 species new to science are here included.

The large larch sawfly, E. Henry (*Rev. Eaux et Forêts, 49 (1910), No. 23, pp. 705–710*).—It is stated that neither the large (*Nematus erichsonii*) nor the small (*N. laricis*) larch sawflies have as yet become the source of injury to larch in France.

On the morphology and ontogeny of the Acaridæ with particular consideration of Pediculopsis graminum, E. Reuter (*Acta Soc. Sci. Fennicæ, 36 (1909), No. 4, pp. 288, pls. 6, figs. 12*).—The author considers the subject in the following manner: (1) The Ecology of *P. graminum* (pp. 5–16); (2) The Morphology of the Acaridæ (pp. 17–114); (3) The Ontogeny of the Acaridæ (pp. 115–231); and (4) Remarks upon the Classification and Phylogeny of the Acaridæ (pp. 232–288).

A bibliography of the literature relating to the subject is appended.

A new filarial species (Filaria mitchelli n. sp.) found in Heloderma suspectum and its larvæ in a tick parasitic upon the Gila monster, A. J. Smith (*Univ. Penn. Med. Bul., 23 (1910), No. 9, pp. 487–497, figs. 9*).—Four of 7 living Gila monsters from Arizona examined by the author were found to be infested by filarial larvæ of the species here described as new. Living and actively moving filarial worms were found in ticks attached to this host. Whether the tick is a true immediate host or whether the larval filariæ taken into the tick with the blood abstracted from the primary host are eventually destroyed, has not yet been determined.

Spraying as an essential part of profitable apple orcharding, R. A. Emerson, R. F. Howard, and V. V. Westgate (*Nebraska Sta. Bul. 119, pp. 3–26, figs. 8*).—This bulletin discusses the cost of, and results obtained from, spraying small orchards, cooperation in spraying small orchards, and gives directions for the preparation and application of insecticides and fungicides. The authors report that during the past 5 years demonstrations have been made in 22 orchards, representing 18 localities in 13 counties of the State.

Absorption of arsenic by apples from spray, P. J. O'Gara (*Better Fruit, 5 (1911), No. 8, pp. 28, 29, fig. 1*).—A preliminary report of investigations, extending over a period of 3 years, on the spotting of apples by arsenate of lead. "A careful examination of the spotted apples shows that only the epidermal and subepidermal cells are injured. . . . The spotting may be only a peculiar red mottling, with more or less distinct outlines, or it may be entirely black, with distinct margins. It varies, however, with the different varieties, and there are all gradations of injury. This injury may appear before the fruit is harvested, depending upon the season, but in most cases it becomes apparent only after the apples have been packed and have remained in storage for a short time." It is said that the spot in no way resembles the "Baldwin spot" which always affects the tissues beneath the epidermis.

The author finds that the injury is not caused by climatic or cultural conditions, late harvesting and overripeness, or weak poorly fertilized trees. "In one particular orchard, with the trees in the very best condition, and which grew prize fruit, the greatest amount of injury was found. . . . An orchard of a few trees, which had received no spray treatments for the past 2 years, and which had received no other attention, did not develop a single spotted fruit excepting those that were purposely sprayed with a soluble arsenical for experimental purposes."

Analyses made of 10 gm. samples of the epidermis and subepidermal tissues of Newtown and Spitzenberg varieties "showed that the black and red spots contained from 0.03 to 0.05 mg., while the apparently sound skins showed 0.025 mg. of arsenic. . . . One analysis of very badly spotted Spitzenberg showed a quantity of arsenic, which, calculated as arsenic oxid (As_2O_5), equaled about 0.3 mg., or approximately 0.005 grains." It is pointed out that there is no danger from eating such apples, as at least 0.005 gm. are required to produce a marked effect.

The author advocates the use of at least 1 lb. of unslacked lime with each pound of lead arsenate.

Paris green, T. E. Keitt (*South Carolina Sta. Rpt. 1910, pp. 45–49*).—This is a report of analyses made of 10 lots of Paris green purchased from different dealers. These samples were found to be unadulterated, the anlyses showing them to be a high-grade lot.

FOODS—HUMAN NUTRITION.

Chemistry of food and nutrition, H. C. Sherman (*New York, 1911, pp. VIII+355, figs. 3*).—The present work, which is the outgrowth of the author's experience in teaching the subject to collegiate and technical students, takes up the fundamental theories of nutrition, the various chapters dealing with organic foodstuffs, the general composition of foods and action of ferments, the course of the food through the digestive tract, the fate of the foodstuffs in metabolism, the fuel value of food and the energy requirement of the body, conditions affecting the total food requirement, protein metabolism and the protein requirement, food habits and dietary standards, iron in food and its functions in nutrition, inorganic foodstuffs and the mineral metabolism, and criteria of nutritive value and economy of foods. In an appendix are given a table showing the edible organic nutrients and fuel values of foods, together with the weight in grams of the portion which would supply 100 calories; a table showing the ash constituents of foods in percentage of the edible portion; and a table showing the ash constituents of foods in grams per 100 calories of edible food material.

According to the author, the purpose of the volume has been to present the principles of the chemistry of food and nutrition with special reference to the food requirements of man and the considerations which should underlie one's judgment of the nutritive value of food, the subject being considered chiefly with reference to the nutritive relations of food.

The numerous references to the literature of the subject which follow each chapter and the detailed index add much to the usefulness of the volume.

Japanese meat inspection, G. N. WEST (*Daily Cons. and Trade Rpts.* [*U. S.*], *14* (*1911*), *No. 43, p. 704*).—Brief statements are made regarding the inspection and slaughtering of cattle in Kobe and Osaka. "It would appear that the precautions to insure that only sound and healthy fresh meat is placed on the market are ample to protect the public, and that the abattoirs are kept in cleanly condition."

Information is also given regarding 2 canneries where chestnuts, bamboo sprouts, and mushrooms are preserved. "In neither of them was there any inspection of the vegetables canned or regulation governing cleanliness."

The comparative rate of decomposition in drawn and undrawn market poultry, MARY E. PENNINGTON (*U. S. Dept. Agr., Bur. Chem. Circ. 70, pp. 22, charts 6*).—The investigation, briefly summarized, was made with 11 shipments of dry-picked, dry-chilled, and dry-packed unwashed fowls killed, transported, handled, and marketed under commercial conditions. The fowls were studied at every stage of marketing from the packer to the consumer, "the marketing throughout being in the market sense 'prompt.'"

The data obtained showed that "undrawn poultry decomposes more slowly than does poultry which has been either wholly or partially eviscerated.

"'Full-drawn' poultry, that is, completely eviscerated, with heads and feet removed, decomposes the most rapidly.

"'Boston drawn' and 'wire drawn' stand midway between the undrawn and full-drawn in speed of decomposition. The 'wire drawn,' which is most like the undrawn, is usually the better."

"The effect of different methods of dressing in the case of delayed marketing is now under investigation."

Chemical and bacteriological data are summarized in an appendix.

Drawn v. undrawn poultry, MARY E. PENNINGTON (*Ice and Refrig., 40* (*1911*), *No. 2, pp. 59–62, charts 6*).—On the basis of her investigations noted above, the author discusses the effects of different methods of handling and storing poultry.

[Baking tests], L. R. WALDRON (*North Dakota Sta., Rpt. Dickinson Substa. 1910, pp. 43, 44*).—In the comparison made of the different varieties of wheats of the crop of 1909 the Galgalos wheat flour produced the largest loaf, with Ghirka second. The color of the Galgalos wheat bread "was very good, and was only exceeded by the Ghirka loaf." The Bowman wheat produced the largest number of loaves from the patent flour obtained per bushel of wheat; on the other hand, it produced the fewest loaves per barrel of patent flour. The Ghirka flour yielded only 36 pound loaves per bushel of wheat.

In the test carried on in 1910 the largest loaf was obtained from Ghirka and Red Fife wheats, and the bread was also of very good color. The smallest loaves were obtained from some of the durum wheats tested. The number of 1-lb. loaves obtained from a barrel of patent flour was 278 for Red Fife, as compared with 275 for Kubanka and 273 for Ghirka. "The flour of the Red Fife would seem to be excellent both from the standpoint of the housekeeper and the baker. The milling value of the Ghirka wheat is good, but it is somewhat inferior to the Red Fife."

Wheat investigations—milling, baking, and chemical tests, E. F. LADD and C. H. BAILEY (*Norh Dakota Sta. Bul. 89, pp. 14–80*).—An extended study of the milling quality, the chemical composition, and the baking quality of wheats grown in 1908 and 1909 was carried on in continuation of earlier work (E. S. R., 20, p. 859). A few samples of flour submitted to the station were included in the test but with these exceptions the wheats studied comprised hard red winter wheats, hard red spring wheats, and durum wheats, collected for the work.

As shown by the results of the investigations, there was a wide range in quality and composition in each class of wheat. With respect to quality the authors believe no hard and fast lines of division can be drawn between the classes. The hard wheats as a whole yielded flours highest in baking strength, and this was also characteristic of the hard spring wheats.

In the case of the wheats grown in 1908 the samples obtained from points west of the Red River Valley yielded flour of better quality than those from the valley counties. In the case of the 1909 crop the differences were less noticeable.

"Hard red winter (Turkey) wheats raised in the northwest did not yield flour of as good quality as the same wheat raised in sections of Kansas and Nebraska, although the flours contained a higher average percentage of crude protein.

"The average durum patent flour, when properly milled, will yield bread of good quality, although somewhat yellow in color.

"The quality of durum wheats is higher when produced in the drier sections of the State."

In order to ascertain the influence which wetting or tempering has upon the yield and quality of flour, tests were undertaken with durum wheats. "While the results were not conclusive, they seem to indicate that the best general results were obtained when the wheat was wet and allowed to stand for 16 to 20 hours, then heated or steamed immediately before going to the rolls. While most merchant mills do not have sufficient storage capacity to enable them to handle the wheat in this manner, these investigations made evident that thorough wetting and storing for as long a time as is possible up to 20 hours or even longer, is to be recommended."

The Humphries process of treating flour (*Millers' Gaz., 34 (1911), No. 44, pp. 546–548, figs. 7*).—A popular summary of the effect upon the size and shape of the loaf of adding bran products to flour and also of the effects of the water used for spraying the wheat during milling. It is claimed that if a water extract of bran products is added in bread making, ash constituents excluded in the manufacture of white flour are restored to the bread.

Changes in the weight of stored flour and butter, J. T. Willard (*Bul. Kans. Bd. Health, 7 (1911), No. 1, pp. 9–14*).—With a view to securing data for use in food inspection work, studies were made of the losses of flour and butter when stored under commercial conditions.

Twenty-seven sacks of flour weighing close to 48 lbs. each were stored for a year and weighed at intervals, the test beginning in August. The sacks were piled in 3 layers of 9 sacks each in an airy room heated to ordinary temperature and screened for protection from mice. The average loss per sack per year was 0.52 lb. The greatest loss in weight, 0.79 lb. per sack, was noted at the end of 8 months, showing that there was a slight gain in weight during the spring and summer months. "It will be seen that it would be quite possible for flour to leave the mill with sacks containing the full amount required and yet be short in weight at a later date, due to loss of moisture."

The loss of water during storage under different conditions was studied with samples of butter packed in tubs and in pound prints wrapped in parchment paper and placed in paraffin cartons. Part of the cartons were packed in a wooden case and others were stored separately. In comparison with these samples, which were placed in cold storage, another lot of wrapped prints in cartons were stored in a room kept at ordinary living temperature. The samples were under observation from the end of December until the beginning of the following July. The wooden case containing butter prints remained unaltered in weight. The tub, which originally contained 64.5 lbs., lost 3.5 lbs. in weight, and the individual prints in cold storage lost on an average 12.4 gm. each. The prints stored in a room at ordinary living temperature lost on an average 25 gm. each.

Butter prints wrapped in double parchment paper and encased in paraffined cartons covered with an outside wrapping paper were also tested, being stored in an open refrigerator in a room heated to some extent, and in cold storage, a part of the samples being packed in a paraffined fiber-board carrying case. In 3 months the butter stored in the open refrigerator lost on an average 15.8 gm. per print. The wrapped prints lost on an average 5.4 gm. each when in storage for 4.5 months, while the wrapped prints in the paraffined pasteboard carrier remained unchanged in weight.

"The results with butter show that prints wrapped in parchment paper and paraffined carton and packed in cases remain constant in weight, but that such prints on prolonged exposure out of the case will lose slightly. It is evident that loss during the time that the retailer would have them out of the case would be unappreciable. Butter packed in wooden tubs will lose somewhat in weight, the water evidently being carried through by the fiber of the wood and evaporating."

The leavening agent in salt-rising bread, WINONA WOODWARD (*Jour. Home Econ., 3 (1911), No. 1, pp. 100, 101*).—The conclusion was reached that the fermentation occurring in salt-rising bread may be due to the presence of one or more organisms accidentally in the corn meal from which the batter used in starting the bread is made, or introduced in some similar way.

The organism isolated was not a yeast but belonged to some other group. "Additional study of the matter should be undertaken and it would be interesting to compare the flavor and quality of the bread when different microorganisms are present. . . .

"A practical deduction from the work reported is that sterilizing the milk before mixing the batter is desirable, since more uniform results may then be expected and a product secured which does not have the unpleasant odor often associated with salt-rising bread."

Bedouin desert bread, J. D. WHITING (*Daily Cons. and Trade Rpts.* [*U. S.*], *14 (1911), No. 39, pp. 630, 631*).—An account is given of the manufacture of bread from the seed of samh (*Mesembryanthemum forskahlii*), a small plant which grows wild over desert areas where nothing is cultivated, since the rain is insufficient for growing grain.

According to the information which the author could gather, the plant "grows in a clayey, sandy, saline soil, and where very little rain falls; it ripens about the same time as barley, but, contrary to most other plants, the seed pods do not open when ripe. They are affected by dampness but not by heat, which enables the Bedouin to collect them all summer.

"Possibly this plant might thrive in some arid region in the United States, and while it never might be used for human food, examination might show it to have an economic value."

Toxic material in vegetable butter and vegetable fat, J. HERTKORN (*Chem. Ztg., 34 (1910), No. 155, pp. 1381, 1382*).—Since crude vegetable fats may contain harmful substances, the author insists that such materials should be thoroughly rectified before they are used in the manufacture of vegetable butter substitutes and also insists upon the need for thoroughly purifying animal fats.

Perennial rice in Senegal, P. Ammann (*Bul. Soc. Nat. Agr. France, 70 (1910), No. 10, pp. 893–900*).—According to the author, various wild or spontaneous rices have been observed in Senegal, but the variety described differs from others in that it spreads by means of rhizomes and may be propagated by this method as well as by seed. The presence of this root system also aids the plant in surviving through an 8 months' dry season.

Analyses are reported of this rice, of a wild and a cultivated rice of the same region, and of the stalks which, together with the young shoots, are used as fodder. In the author's opinion propagation of this perennial rice is probably easy and he believes the plant might be improved by hybridizing. Data regarding the composition of perennial rice (plant and seed), wild rice, and rice cultivated locally follow:

Composition of perennial rice and other rice samples.

Material.	Water.	Protein.	Fat.	Starch.	Total cellulose.	Saccharifiable cellulose	Ash.	Undetermined.
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Perennial rice seed	13.81	5.80	2.05	70.50	2.35	4.50	0.58	0.41
Wild rice from Niafounké	12.24	7.74	1.60	69.80	2.15	4.00	.80	1.67
Cultivated rice from Niafounké	12.10	6.24	2.00	70.20	2.70	4.80	.70	1.26
Perennial rice, stalks dry	16.90	3.06	.72	....	21.55	45.45	9.94	2.38
Perennial rice, stalks green	69.30	2.15	.39	....	10.44	9.30	2.50	5.92

Pomegranates (*Pure Products, 7 (1911), No. 2, pp. 66, 67*).—Data regarding the composition and uses of pomegranate are summarized, particularly with reference to the making of pomegranate sirup, which is commonly known as grenadine sirup.

The preservation of fruit juices with fluoric acid, II, R. Cohn (*Ztschr. Öffentl. Chem., 17 (1911), No. 1, pp. 2–12*).—Analytical and other data are presented which have to do with the use of fluoric acid as a preservative, its subsequent removal from the material preserved, and the status of such goods under the pure-food law.

Studies of the use of fluorids in preserved tomatoes, E. Carlinfanti and R. Tuffi (*Arch. Farmacol. Sper. e. Sci. Aff., 8 (1909), Nos. 8, pp. 377–384; 9, pp. 385–394*).—A large number of samples of preserved tomatoes were studied.

Salts of tin in canned sardines, E. W. Duckwall (*Canner and Dried Fruit Packer, 32 (1911), No. 2, pp. 36, 38*).—Almost no bacteria and only very small quantities of dissolved tin were found in 4 samples of sardines. In the case of other samples examined tin at the rate of 2.2 grains per pound in one case and 2.8 grains per pound in another was noted, the latter being sardines packed in vinegar, oil, and mustard, in which, as the author points out, "the corrosive action . . . is increased by the other ingredients."

Concerning coffee, K. Gorter (*Liebig's Ann. Chem., 379 (1911), No. 1, pp. 110–130*).—The author has continued his investigations of chlorogenic acid from coffee previously reported (E. S. R., 20, p. 262).

Concerning coffee glazes, E. von Raumer (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 2, pp. 102–109*).—Since changes in the German coffee duties have been in force the soluble coffee glazes are again noted. With a view to securing data concerning such materials, the author reports the results of the examination of unglazed and glazed coffees and the composition of a coffee glaze.

Food inspection decision (*U. S. Dept. Agr., Food Insp. Decision 131, pp. 2*).—This decision has to do with the amended requirements for evaporated milk. Henceforth the fat percentage must not be less than 7.8 and the sum of the percentages of fat and total solids not less than 34.3.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 741, pp. 2; 742, pp. 3; 743–744, p. 1 each; 745, pp. 2; 746–747, p. 1 each; 750, pp. 14; 751, p. 1; 754, pp. 2; 760–762, p. 1 each; 763–764, pp. 2 each; 765–767, p. 1 each*).—These notices of judgment have to do with the adulteration of tomato pulp, desiccated egg product, tomato paste, tomato catsup, catsup, mince-meat, and belladonna root, powdered henbane, powdered gentian root, and powdered cloves-amboyna; the misbranding of drug products, liqueur "curaçao," olive oil, and extract of wintergreen; and the adulteration and misbranding of soft drinks and tomato paste.

[Examination of food and drugs], R. E. Rose (*Fla. Quart. Bul. Dept. Agr., 21 (1911), No. 1, pp. 103–138*).—Data are given regarding the examination of a large number of samples of beverages, confectionery, sweet potato flour, cassava flour, dairy products, drugs, and other materials under the provisions of the state pure-food law.

[Examination of foods, and other food topics], E. F. Ladd and Alma K. Johnson (*North Dakota Sta. Spec. Bul. 30, pp. 287–296, 298–302*).—This includes analyses of 34 samples of canned tomatoes, a considerable number of water analyses, a list of beverages registered for 1911, some data regarding the labeling of sardines as to weight, a discussion of cold storage food products, and other data.

Biennial report of the state chemist, 1909–10, H. Harms (*Bien. Rpts. State Dairy and Food Comr., State Chem., and State Dairy and Food Bur. Utah, 1909–10, pp. 73–156*).—This report contains data regarding the examination of samples of evaporated milk, cream, and other dairy products, oleomargarine, baking powder, canned goods, olive and salad oils, and miscellaneous food materials.

Food customs and diet in American homes, C. F. Langworthy (*U. S. Dept. Agr., Office Expt. Stas. Circ. 110, pp. 32*).—This circular is a revision and extension of an article published in the Yearbook of the Department for 1907 (E. S. R., 20, p. 264). It discusses popular ideas regarding diet, food habits and their origin, and methods of making and recording food investigations, studies of the kind of food eaten in American homes, the adequacy of the average American diet, and other topics which have to do with the use in the home of agricultural food products, and presents a summary of the results of dietary studies and digestion experiments.

The information summarized is very largely drawn from the results of experiments carried on and data collected as part of the nutrition investigations of this Office.

[Report of subsistence officer in charge of the subsistence department, Isthmian Canal Commission], E. T. Wilson (*Ann. Rpt. Isthmian Canal Com., 1910, pp. 323–325*).—This report contains data regarding the kind and cost of food supplied at the Isthmian Canal Commission hotels and messes.

The total number of hotels in operation on June 30, 1910, was 19; European laborers' messes, 19; and common laborers' kitchens, 20. The total revenue for the year from the line hotels, messes, and kitchens was $1,350,658.05, and the total expenses were $248,313.71. The total number of meals served at Isthmian Canal Commission hotels was 2,176,451; the cost for supplies was 24.87 cts. per meal, and the expense involved was 6.23 cts. per meal. The total number of rations furnished in European laborers' messes was 1,092,487, which cost 30.18 cts. per ration for food including ice, and 6.66 cts. per ration for expense. The total number of rations served in common laborers' kitchens was 781,746, which cost 22.66 cts. for food, and 4.63 cts. for expense. The average daily attendance during June, 1910, in the kitchens was 1,496; in the messes, 3,178; and in the line hotels, 1,915.

[Using average values for the composition of foods as purchased, it has been calculated that the European laborers' messes would supply 201 gm. protein and 5,428 calories energy per person per day, and the common laborers' kitchens 148 gm. protein and 4,680 calories energy. The amounts actually eaten were not calculated, as no data regarding the waste and refuse were available.]

Increased expenditures of poor families in the German Empire (*Erhebungen von Wirtschaftsrechnungen minderbemittelter Familien im Deutschen Reich, bearbeitet im Kaiserlich Statistischen Amte, Abteilung für Arbeiterstatistik. Berlin, 1909, pp. 77+229; Reichs Arbeitsbl., 7 (1909), Spec. No. 2; abs. in Hyg. Rundschau, 20 (1910), No. 15, pp. 848, 849*).—Statistical data regarding expenditures of working men's families are summarized. Considering 852 families, the expenditure for food and condiments was 45.6 per cent of the total.

Growth and nutrition, II. ARON (*Biochem. Ztschr., 30 (1910), No. 3-4, pp. 207-226*).—From his experiments the author concludes that the force which he calls "growth tendency" is more noticeable in the skeleton than in other parts of the body. If an animal fasts the skeleton grows at the expense of the rest of the body, the fatty tissues being used first, and the other organs later, since the more important organs are also the more resistant. In his opinion the force which induces growth is resident in the skeletal framework, the muscular tissue possessing apparently no specific "growth tendency," but, perhaps owing to mechanical forces, following the skeleton in its growth provided the nutrition is sufficient to permit it.

Experimental data are discussed with reference to the relative development of the subjects (dogs) and to some extent with reference to the general problem of animal feeding.

Concerning the nutrition of fish, A. LIPSCHÜTZ (*Ztschr. Allg. Physiol., 12 (1911), No. 1-2, pp. 59-117*).—Experimental studies which include the measurement of oxygen consumed are reported and discussed.

The metabolism of fish during fasting, A. LIPSCHÜTZ (*Ztschr. Allg. Physiol., 12 (1911), No. 1-2, pp. 118-124*).—Experimental studies are reported. When asparagin, glucosamin, and grape sugar were dissolved in the water in which carp were kept, these organic substances were not utilized as food, and the general conclusion is drawn that such dissolved organic compounds can not be utilized.

Fasting studies.—I, Nitrogen partition and physiological resistance as influenced by repeated fasting, P. E. HOWE and P. B. HAWK (*Jour. Amer. Chem. Soc., 33 (1911), No. 2, pp. 215-254, dgm. 1*).—The investigation which was made included 2 fasting periods separated by a period during which the subject (a dog) was carefully fed.

Quotations from the authors' summary follow:

"A consideration of the summation of the nitrogen balances [reported] shows that there is a minimum amount of nitrogen which must be present in the body in order that life shall exist. . . .

"Assuming the accuracy of the theory that the urinary creatin represents disintegrated muscular tissue and calculating accordingly, a discrepancy exists between the calculated mass of muscular tissue lost, when considered from the standpoint of total nitrogen and creatin nitrogen respectively. When all the facts in this connection are taken into consideration it is apparent that over 50 per cent of the total nitrogen had a source other than the muscular tissue.

"The creatin content of muscle showed a marked decrease (over 60 per cent) as a result of fasting, while the nitrogen content of similar muscle was but slightly lowered. This pronounced decrease of creatin found by us in fasting muscle is a most significant fact and shows clearly that in fasting we can not, with accuracy, consider the total amount of excreted creatin as resulting from the complete and permanent disintegration of muscular tissue. It appears that the creatin of the urine is derived either from disintegrating muscular tissue or is removed in some manner from such tissues which are still functioning within the body.

"As a result of our experiments we have shown that in repeated fasting there is a slower and less profound tissue disintegration during the second fast, indicating a greater resistance of the body acquired as a result of the initial fast. This increased resistance, noted in our experiments, following fasting may indicate that the 'repeated fast,' if properly regulated, may possess important therapeutic properties."

The effect upon the glycogen content of the liver of feeding different kinds of sugar, H. HAFFMANS (*Über den Einfluss der Fütterung verschiedener Zuckerarten auf den Glykogengehalt der Leber. Inaug. Diss., Univ. Bern, 1910, pp. 60*).—The experiments reported were made with dogs.

Considering the amount of glycogen in the liver of the control animal as 1, the relative amounts of glycogen accumulated 8 hours after feeding the different sugars were as follows: Sacchrose, 2.83; lactose, 1.25; dextrose, 4.06; maltose, 1.47; galactose, 1.43; and levulose, 2.99. On the same basis of comparison, in a 16-hour period, the amounts ranged from 1.51 with levulose to 5.16 with saccharose, while in an 8-day period the values were 4.08 for saccharose, 1.39 for lactose, and 3.63 for dextrose.

Concerning the metabolism of phosphorus in the animal body, F. ROGOZIŇSKI (*Bul. Internat. Acad. Sci. Cracovie, Cl. Sci. Math. et Nat., Ser. B, 1910, No. 4, pp. 260–312; abs. in Chem. Zentbl., 1910, II, No. 20, p. 1549*).—In experiments with dogs it was not found that sodium phosphate, phytin, or lecithin exercised any appreciable effect upon the renal excretion of nitrogen or upon nitrogen or phosphoric acid gains.

The phosphoric acid of the sodium phosphate and lecithin underwent cleavage in the body and apparently was excreted quantitatively in the urine as inorganic phosphate. Of the phosphoric acid of phytin only about 30 per cent appeared in the urine, the remainder being apparently excreted unchanged in the feces. On the other hand, in experiments with man phytin apparently undergoes complete cleavage in the digestive tract; owing in part to the action of the intestinal bacteria. This conclusion was reached since the author found that in experiments in vitro the phosphoric acid was thus split off from the phytin present in feces. A small part of the phosphoric acid of phytin is apparently retained by man, while the remainder is excreted in the feces as inorganic phosphate. When phytin was taken per os inosit was not identified in the urine.

An inquiry into some chemical factors of fatigue, W. BURRIDGE (*Jour. Physiol., 41 (1910), No. 5, pp. 285–307, figs. 8*).—In a study of the effects of different substances on fatigue, the author found that the motor nerve endings of the muscle were more susceptible to the action of each of the possible fatigue substances examined than was the case with any of the other elements in a muscle and nerve preparation.

"Evidence has been brought forward for believing that free circulating potassium salts, having their origin in working muscles, form an important factor in the general fatigue observable after heavy work."

"The action of potassium salts never appeared to be poisonous, for a complete recovery of a muscle and nerve was obtained after perfusion of all concentrations of the salt. . . .

"The action of lactic acid corresponded closely with that due to the excessive fatigue of an overworked muscle. The nerve endings were very markedly affected, and their subsequent recovery from the effects of the acid took some time. The effects produced are almost entirely due to the hydrogen ion.

"Under the conditions assumed to exist in a hard working muscle, even such traces of lactic acid as have been found in 'resting' muscle were found capable of abolishing the indirect response for some time. Hence it was considered that lactic acid must be neutralized, and that the limit of the working capacity of the intact muscle is reached at the stage when lactic acid has been produced so as to be present in the free condition beyond the merest traces. When such free lactic acid is present, the subsequent recovery of the indirect response will show a more or less marked delay, e. g., stiffness.

"A possible rôle of creatin is the neutralization of lactic acid; and where this is insufficient, ammonium lactate, with subsequent formation of purins, may represent a further attempt at such neutralization.

"The hydrogen ion is a necessary concomitant of waves of variation in the response of a fatigued muscle."

Contribution to the physiology of the intestine, U. Lombroso (*Arch. Farmacol. Sper. e. Sci. Aff., 9 (1910), Nos. 6, pp. 262–288; 7, pp. 289–298*).—A series of experiments which have to do with the functions of the intestinal tract is reported and discussed.

The bacillus of long life, L. M. Douglas (*London and Edinburgh, 1911, pp. VII+164, pls. 57, figs. 5*).—The author has collected and summarized a large amount of historical and other data with reference to the theory that the use in the diet of soured milks of different sorts tends to prevent putrefactive changes in the intestine and so favors health and longevity. Such subjects are considered as the bacteriology of fermented or soured milk, the preparation of soured milk in the house and in the dairy, and soured milk in health and disease. The book, as a whole, is a collection of data which might be considered as favoring the theory advanced rather than of evidence on the question as a whole.

ANIMAL PRODUCTION.

Nutritive value of cholla fruit, A. E. Vinson and W. H. Ross (*Arizona Sta. Rpt. 1910, pp. 396, 397*).—From the digestive coefficients found for cholla fruit (*Opuntia fulgida*) and from other investigations it is estimated that not less than 45 lbs. of cholla fruit would be required daily for a sheep of 120 lbs. shorn live weight. This would contain over 1.3 lbs. of mineral matter, of which 0.5 lb. would be absorbed and require elimination by the kidneys. On one-fourth of this amount of cholla fruit, supplemented by a little alfalfa, the feces would no longer remain normal, and any marked increase would lead to scouring.

A nitrogen metabolism experiment with cholla fruit, supplemented by alfalfa and water-grass hay, showed that a sheep receiving 2 oz. of alfalfa daily and cholla fruit would not be able to maintain indefinitely its nitrogen equilibrium. When about ½ lb. of alfalfa and a like amount of water-grass hay was given with cholla fruit ad libitum, of which about 4 lbs. was eaten, the nitrogen balance was restored.

From these results it is estimated that from ½ to ¾ lb. of alfalfa and 6 or more pounds of cholla fruit would maintain a sheep indefinitely in a lean but healthy condition. No injurious effects were observed to follow cholla feeding. It is stated that somewhat more favorable results may be anticipated with cattle.

On the effect and suitability of poppy-seed cake, A. KEMNER (*Ueber die Wirkung und Gedeihlichkeit der Mohnkuchen. Inaug. Diss., Univ. Bern, 1909, pp. 24*).—Poppy-seed cake obtained from the East Indies was fed in rations to swine, milch goats, and cows without apparent harmful effect. The milk of the lactating animals was not changed in any perceptible manner, and the cake is recommended as a suitable feed for stock.

The feeding of sugar, sugar beets, and by-products of sugar-beet factories in 1910, A. STIFT (*Wiener Landw. Ztg., 61 (1911), No. 14, pp. 144, 145*).—A summary of some experiments in feeding animals made during the year.

The present status of the beet-leaf drying industry, L. KÜHLE (*Deut. Zuckerindus., 35 (1910), No. 45, Beilage 1, pp. 861–864*).—This paper discusses the various methods and the machinery for drying beet leaves, the use of the product for feeding animals, and a report by the experiment station at Möckern in regard to the composition of the product and its feeding value. Details in regard to the cost of production are given.

Commercial feeding stuffs, E. H. JENKINS and J. P. STREET (*Connecticut State Sta. Rpt. 1909–10, pt. 8, pp. 619–656*).—Analyses are reported of maize, linseed meal, cotton-seed meal, cotton-seed feed, wheat, rye. oats, barley, maize, and buckwheat products, gluten feed, malt sprouts, distillers' grains, brewers' grains, alfalfa products, and mixed feeds. There are also comments on the state law regulating feeding stuffs.

Average composition of commercial feeding stuffs, R. E. ROSE and E. P. GREENE (*Fla. Quart. Bul. Dept. Agr., 21 (1911), No. 1, pp. 35–37, 83–102*).—Analyses are reported of cotton-seed and linseed meals, wheat by-products, corn, corn meal, corn cobs, corn-and-cob meal, hominy feed, barley, barley sprouts, oats, rice, rice by-products, rye, rye bran, cowpeas, cowpea hay, velvet beans and hulls, velvet bean hay, beggar weed hay, Japanese kudzu hay, gluten feed, beef scrap, giant millet, maiden cane hay, blood meal, and mixed feeds.

Inspection and analyses of commercial feeding stuffs, W. F. HAND ET AL. (*Mississippi Sta. Bul. 144, pp. 69*).—Analyses are reported of corn chop, wheat products, rice products, and proprietary mixed feeds. A brief discussion of some principles of animal nutrition are given, with rations for different kinds of live stock and notes on the state feeding stuff law.

Inspection and analyses of commercial feeding stuffs, W. F. HAND ET AL. (*Mississippi Sta. Bul. 145, pp. 3–25*).—Continuing the work noted above, analyses are reported of 205 samples of corn chop, wheat products, rice products, hominy feed, and various proprietary mixed feeds.

Stock feeds, G. M. MACNIDER, E. W. THORNTON and W. H. STROWD (*Bul. N. C. Dept. Agr., 31 (1910), No. 11, pp. 64*).—Analyses are reported of wheat and wheat products, flour, shipstuff, by-products of rye and rice, oat feed, corn and oat chop, molasses and mixed feeds, dried beet pulp, hominy feed, cotton-seed meal, peanut meal and hulls, gluten feed, cracked corn, meat meal, screenings, and poultry feeds.

[Analyses of feeding stuffs], T. E. KEITT (*South Carolina Sta. Rpt. 1910, pp. 42–45*).—The chemical analysis of a sample of kudzu vine gave the following percentages: Water 69.4, protein 5.48, fat 1.05, nitrogen-free extract 13.58, fiber 8.25, and ash 2.24, and when air-dried contained 7.07 per cent of water. Analyses are also reported of cowpea vine, rice meal, cotton-seed meal, bran, beet pulp, and mixed feeds.

Analyses of feeding stuffs, H. IMMENDORFF (*Ber. Landw. Vers. Stat. Univ. Jena, 1909, pp. 11–15*).—Analyses are reported of cotton-seed meal, peanut cake meal, palm nut cake meal, linseed cake meal, rice meal, dried brewers' grains, and sesame cake.

Feeding stuffs, P. LIECHTI (*Landw. Jahrb. Schweiz, 24 (1910), No. 7, pp. 530–539*).—Analyses of sesame-oil cake, peanut cake, linseed cake, wheat bran, dried brewers' grains, fish meal, soy beans, soy-bean cake, and mixed feeds are reported.

Analyses of stock foods and Victorian native and introduced grasses, P. R. SCOTT (*Rept. Dept. Agr. [Victoria], 1907–1910, pp. 25–27*).—The stock foods analyzed included oat hulls, oat branning, maize meal, malt combings, malt kiln dust, and molasses. The analyses of the native plants included *Polygonum minus*, bracken fern (*Pteris aquilina*), and the following grasses: Paramatta rat tail (*Sporobolus indicus*), kangaroo (*Anthistiria ciliata*), wallaby (*Danthonia semiannularis*), fine-leaved wallaby (*D. penicillata*), panic (*Ehrharta stipoides*), meadow or weeping rice (*Microlæna stipoides*), toothed bent (*Agrostis solandri* or *Deyeuxia forsterii*), Australian love (*Eragrostis brownii*), king's clover (*Melilotus officinalis* and *Eleusine germinata*), long-haired plume or mouse (*Dichelachne crinita*), wheat (*Agropyrum scabium*), corkscrew (*Stipa setacea*), small-flowered love (*Eragrostis pilosa*), mat (*Hermarthria compressa*), rough feather (*Stipa scabra*), blady (*Imperata arundinacea*), and wiry (*Poa cæspitosa*). The introduced plants included the hog weed (*Polygonum aviculare*), *Plantago lanceolata*, and the following grasses: Cocksfoot (*Dactylis glomerata*), prairie (*Bromus unioloides*), English rye (*Lolium perenne*), buffalo (*Stenotaphrum americanum*), couch (*Cynodon dactylon*), Kentucky blue (*Poa pratensis*), summer reddish panic (*Panicum sanguinale*), pigeon or black-beaked panic (*Setaria viridis*, var. *imberbis*), Toowomba canary (*Phalaris commutata*), long-styled feather (*Pennisetum longistylum*), herd's or Fiorin (*Agrostis alba*), and golden crown (*Paspalum dilatatum*).

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 748, p. 1; 749, pp. 2; 752, pp. 2; 755, p. 1; 756, pp. 2; 757, p. 1; 758, pp. 2; 759, p. 1*).—These relate to the adulteration and misbranding of oats and cotton-seed meal.

Feeds and feeding, W. A. HENRY (*Madison, Wis., 1910, 10. ed., rev., pp. VIII+613*).—A new edition of this standard work (E. S. R., 10 p. 82), so written as to include the results of recent investigations.

The scientific feeding of animals, O. KELLNER, trans. by W. GOODWIN (*London, 1909, pp. XIII+404*).—A translation and abridgment of this well-known treatise.

On the necessity for increasing animal production, B. MORESCHI (*Bol. Quind. Soc. Agr. Ital., 15 (1910), No. 7, pp. 277–294*).—A statistical account of the output of animals and animal products in Italy, with suggestions for increasing it in quantity and quality.

The essential factors in the acclimatization of European animals in warm countries, MEULEMAN (*Les Facteurs Essentiels de L'Acclimatement du bétail Européen dans les Pays Chauds. Paris: Assoc. Sci. Internat. Agron. Colon., 1909, pp. 23*).—A discussion of the effect of humidity and temperature on the animal body, with notes on some tropical parasites of animals.

Contribution to the study of the acclimatization of European animals in Costa Rica, F. PERALTA (*Contribution a L'Étude de L'Acclimatement du bétail Européen au Çosta Rica. Etampes, France: Assoc. Sci. Internat. Agron. Colon., 1910, pp. 8*).—A brief account of the conditions which must be overcome on introducing European breeds of cattle to Costa Rica.

Factors of acclimatization of European animals in Algeria and in other warm countries, T. MONOD (*Des Facteurs de L'Acclimatation du bétail Européen en Algérie et dans les Pays Chauds. Étampes, France: Assoc. Sci. Internat. Agron. Colon., 1909, pp. 27*).—Besides a general consideration of the effect of climatic factors and the change of food, results are reported which have already been obtained in introducing European breeds of live stock into Algeria.

Essential factors in the acclimatization of European animals in Tonkin, E. DOUARCHE (*Les Facteurs Essentiels de L'Acclimatement du bétail Européen au Tonkin. Étampes, France: Assoc. Sci. Internat. Agron. Colon., 1910, pp. 23*).—This is chiefly a description of the climatic factors in Tonkin which unfavorably affect the European breeds of live stock.

Physiology of man and mammals, R. DU BOIS-REYMOND (*Physiologie des Menschen und der Säugethiere. Berlin, 1910, 2. ed., pp. XII+644, figs. 139*).—A revised edition of a treatise written for students who wish to get a general outline of the comparative physiology of man and higher animals.

Plasm and cells.—A general anatomy of living matter, M. HEIDENHAIN (*Plasma und Zelle.—Allgemeine Anatomie der Lebendigen Masse. Jena, 1907, vol. 1, pt. 1, pp. VIII+506, figs. 276; 1911, pt. 2, pp. VI+507–1110, pl. 1, figs. 395*).—This work is intended to serve as a foundation for the study of microscopical anatomy. The first part of volume 1 treats of the general properties of the cell and its parts, while the second part discusses in detail muscular tissue and the physiology of contractility.

Each chapter is accompanied with an extensive bibliography.

Cultivation of adult tissues and organs outside of the body, A. CARREL and M. T. BURROWS (*Jour. Amer. Med. Assoc., 55 (1910), No. 16, pp. 1379–1381*).—Experiments are reported on the successful cultivation of connective tissue, cartilage, bone, and other tissues from various organs of dogs, cats, and frogs on artificial media in a way similar to the cultivation of bacteria. The importance of these results to the study of biology and pathology is pointed out.

Tissues and organs cultivated outside the body, J. B. HUBER (*Sci. Amer., 103 (1910), No. 19, p. 359*).—A popular summary of the work of Harrison [a] on embryonic transplantation and that of Carrel and Burrows (noted above).

The stability of life.—A study of energetics as applied to the evolution of species, F. LE DANTEC (*La Stabilité de la vie; étude énergétique de l'évolution des espèces. Paris, 1910, pp. 300; rev. in Ztschr. Induktive Abstam. u. Vererbungslehre, 4 (1911), No. 3–4, pp. 293, 294*).—A physico-chemical view of life that is in accord with the transformism of Lamarck.

"Fatness" as a cause of sterility, F. H. A. MARSHALL and W. R. PEEL (*Jour. Agr. Sci., 3 (1910), No. 4, pp. 383–389, pl. 1*).—A histological study of the generative organs of 7 fat heifers. Next to the presence of lipochrome the most noteworthy characteristic of the ovaries was the number of degenerative follicles in various stages of atrophy.

"Conclusions reached are that the derangement of the estrous cycle in fat animals is caused by a disturbance of the ovarian metabolism as manifested especially by a considerable deposition of pigmented fat or lipochrome in the interstitial tissue, and that this process is accompanied by an unusually extensive degeneration of follicles which may lead to a prolonged state of sterility. However, since the degeneration does not usually occur to any especially great extent in the smaller or less mature follicles, it may be inferred that the sterility so induced is commonly of a transient nature, and can be reme-

---

[a] Proc. Soc. Expt. Biol. and Med., 4 (1906–7), p. 140; Jour. Expt. Zool., 9 (1910), No. 4, p. 787.

died sooner or later by a reduction in the quantity of food supplied or by an increase in the amount of exercise."

Heredity in the light of recent research, L. DONCASTER (*Cambridge, 1910, pp. X+140, figs. 12*).—A brief popular work on variation, the statistical study of heredity, Mendelian heredity, and the material basis of heredity. A glossary of technical terms and a bibliography are appended.

Hereditary characters and their modes of transmission, C. E. WALKER (*London, 1910, pp. XII+239; rev. in Lancet [London], 1910, II, No. 23, p. 1617; Nature [London], 85 (1911), No. 2156, p. 536*).—A treatise which covers the whole field of heredity, but in which is proposed a theory that attempts to harmonize the views of Mendelists and the biometricians by assuming that some elements of the cell are inherited in an alternative manner. These are called individual characters and are contained in the chromosomes, while the racial characters divide in bulk and are blended as transmitted.

The relative inheritance of ear length in rabbits according to Castle, and the problem of blending inheritance in the formation of hybrid races, A. LANG (*Ztschr. Induktive Abstam. u. Vererbungslehre, 4 (1910), No. 1, pp. 1–23; abs. in Arch. Rassen u. Gesell. Biol., 7 (1910), No. 6, pp. 752, 753*).—A critical discussion of Castle's work, previously noted (E. S. R., 21, p. 772).

Are particular chromosomes sex determinants? T. H. MONTGOMERY, Jr. (*Biol. Bul. Mar. Biol. Lab. Woods Hole, 19 (1910), No. 1, pp. 1–17*).—A review and criticism of the sex-chromosome theory, which is considered a crude hypothesis, although it is deemed probable that the activities of the chromosomes may affect in some way the sex of the organism. The author insists that there is no valid reason to interpret sex as an immutable unit character resident in or presided over by particular chromosomes and sorted out and distributed by Mendelian segregation with all the complex mechanisms of dominance and determiners, but rather as a growth of the results of a labile process which may be changed by a variety of influences.

A bibliography is appended.

[The identification of animals by means of modifications in the epidermis about the muzzle], H. G. BOEHME (*Exterioristische Betrachtungen über die Formationes parorales et paranaricae der Wiederkäuer, Suiden und Carnivoren des Hausstandes in Bezug auf die Möglichkeit einer Benutzung zur Individualcharakteristik u. Kennzeichnung der Tiere. Inaug. Diss., Univ. Bern., 1910, pp. 24, pl. 1, figs. 2*).—From a study of the epidermal tissues about the nose and mouth of animals, the author believes that impressions may be taken, as in the Bertillon system of the identification of criminals, which may assist materially in the identification of individuals in cattle, sheep, goats, swine, and dogs. The method is not applicable in the case of the cat and the horse. It is thought that this means of identification, combined with measurements and photographs, will be of service for veterinary inspectors, breeders, and in cases at law where the ownership or identification of animals is necessary. Directions are given for making the impressions.

A bibliography is appended.

Investigations on the annual horn rings of cavicornia as an indication of the age of the animal, with special reference to cattle, G. SCHROEDER (*Untersuchungen über die Jahresringe als Altersmerkmal der Cavicornier unter spezieller Berücksichtigung des Rindes. Inaug. Diss., Univ. Bern, 1909, pp. 91, pls. 3*).—Investigations on the fetal growth of horny tissues are summarized, and a report is made of a study on the growth of the rings on horns of mature cattle and sheep.

Measurements were made of a large number of animals. The age could not be determined with any degree of accuracy by means of the rings in the case of bulls, castrated animals, or heifers previous to the time of the first calf. The rings, however, were found to be an approximate indication of age in cows, provided they had been regularly in calf, although other factors such as food tend to obscure or modify the size of the ring.

Farm stock 100 years ago, W. GILBEY (*London, 1910, pp. XVII+154, pls. 14, fig. 1*).—A survey of the live stock industry in England during the reign of George III, with notes on changes in flocks and herds since that time. There are brief biographical sketches of a few famous English breeders.

History of Aberdeen-Angus cattle, J. MACDONALD and J. SINCLAIR (*London, 1910, rev. ed., pp. XVII+682, pls. 35, figs. 2*).—This is a new edition of a work published in 1882, which is intended to be a work of reference concerning "the foundation, improvement, extension, and substantial merits of the Aberdeen-Angus breed." The revision has been accomplished with the cooperation of many prominent breeders.

Studies of the Harz cattle, with special reference to the Upper Harz breeding stock, O. HEINE (*Studien über das Harzrind mit besonderer Berücksichtigung des Oberharzer männlichen Zuchtviehs. Inaug. Diss., Univ. Bern, 1910, pp. 54*).—This is an account of the history, geographical distribution, and characteristics of the Harz breed of cattle. Measurements of many bulls at different ages are given.

Sheep breeding, F. W. WILSON (*Arizona Sta. Rpt. 1910, pp. 386–389, fig. 1*).—A report on the condition of the breeding flocks at the station, and the system of keeping records of the work in sheep breeding. The average weight of lambs at birth, at 6 months, and at 1 year of age is given. An apparatus for testing the elongation and breaking strength of wool fiber, devised by W. W. Henley of the department of mechanic arts of the University of Arizona, is described.

The sheep of Sardinia and their products, P. SPISSU (*Gior. R. Soc. Naz. ed Accad. Vet. Ital., 58 (1909), Nos. 50, pp. 1054–1060; 51, pp. 1177–1184; 52, pp. 1193–1202; 59 (1910), Nos. 2, pp. 27–33; 3, pp. 50–56*).—A general and statistical account of the sheep industry in Sardinia.

A critical consideration of the derivation and relationship of the domestic goat, based upon comparative anatomy and cross breeding experiments, with special reference to its relationship with Capra jerdoni Hume, E. BINDER (*Kritische Betrachtungen über Abstammung und Verwandtschaft der Hausziege auf Grund anatomischer Untersuchungen und Kreuzungsexperimenten mit besonderer Berücksichtigung der Verwandtschaft mit Capra jerdoni Hume. Inaug. Diss., Univ. Bern, 1910, pp. 34, pl. 1*).—This contains skeletal measurements of different breeds of goats and a brief historical sketch of goat breeding, and reports experiments in crossing the domestic goat with 2 varieties of *C. falconeri*.

Inheritance in race horses.—Coat color, R. BUNSOW (*Mendel Jour., 1911, No. 2, pp. 74–102, charts 2*).—A discussion of inheritance of coat color in race horses. The need of having the colors accurately described in studbooks for the purpose of studying inheritance is pointed out.

The origin of dun horses, J. C. EWART, J. WILSON, and J. B. ROBERTSON (*Nature [London], 85 (1910), Nos. 2141, p. 40; 2143, p. 106; 2144, pp. 138, 139*).—Additional notes of a controversial nature concerning data previously noted (E. S. R., 24, p. 376).

The age of speed sires (*Amer. Nat., 44 (1910), Nos. 521, pp. 306, 307; 523, pp. 431–433; 525, pp. 564–567*).—A further discussion by F. R. Marshall and C. L. Redfield concerning the relation of selection to the age of speed sires (E. S. R., 20, p. 1174).

Breeding horses for the army, J. E. Downing (*Breeder's Gaz., 59 (1911), No. 9, pp. 563, 564, fig. 1*).—An outline of a plan for supplying horses for the service of the United States Army.

The half-bred horse, A. Gallier (*Le Cheval de Demi-Sang. Paris, 1908, pp. VI+332*).—This book treats of the origin, characteristics, and uses of cross-bred horses in the different districts of France.

The encyclopedia of the stable, V. Shaw (*London and New York, [1910], pp. 363, pls. 15, figs. 102*).—"A complete manual of the horse, its breeds, anatomy, physiology, diseases, breeding, breaking, training, and management, with articles on harness, farriery, carriages, etc."

Heads, combs, wattles, and ear lobes of standard bred fowls, F. L. Sewell (*Rel. Poultry Jour., 17 (1910), Nos. 1, pp. 54, 55, 84, figs. 4; 2, pp. 171–173, 249–252, figs. 8; 3, pp. 331–333, 354, 355, figs. 11; 6, pp. 608–610, 628–631, figs. 6; 9, pp. 852–855, 893–896, figs. 9*).—This article discusses the different types of heads, the correlation between head and comb, and the type of head as an index to the type of body. Ideal heads of fowls, defects of the head, and heads of prize-winning birds are illustrated and described.

A note regarding variation in the single combs of fowls, R. Pearl (*Mendel Jour., 1911, No. 2, pp. 189–195*).—An answer to a criticism of work previously noted (E. S. R., 23, p. 674).

Construction of a modern poultry house and report of experiments in hopper feeding laying hens, H. Atwood (*West Virginia Sta. Bul. 130, pp. 195–206+7, pls. 3, dgms. 7*).—A report is given of a trial of the hopper feeding-system for poultry, which was installed in order to save labor. In a year's test with 5 pens of white Leghorns the cost of food varied from 68 cts. to $1.04 per fowl per year, and averaged 90 cts. per fowl for the 100 fowls in the experiment. The egg production varied from 81.4 eggs per hen, when fed principally upon corn, to 124.7 in the pen which received whole grain once per day, scattered in litter, and dry mash and beef scrap ad libitum in a hopper. The food cost of the eggs during the year varied from 8.5 cts. to 11.9 cts. per dozen. Two pens, hopper fed, produced eggs having a lower food cost than the pen which received moistened mash, and in this test there was apparently no benefit from the extra labor involved in moistening the mash.

The open-front laying house, previously noted (E. S. R., 19, p. 1172), has continued to give satisfaction in respect to the comfort and health of the fowls, but the double wall on the north side of the house has proved to be an excellent harbor for rats, and the method of construction is not recommended. A new open-front house of another type, 24 by 64 ft., large enough to house 400 Leghorns and costing $450, is illustrated and described.

DAIRY FARMING—DAIRYING.

A dairy laboratory guide, H. E. Ross (*New York, 1910, pp. VI+84, pl. 1*).—This is designed as a guide for students engaged in dairy laboratory work, and brief explanations are given with each exercise, although the work is not intended to be used in the place of a general text-book on dairying. The book can also be used by the practical dairyman who wishes to test milk and its products.

Systems of dairying, W. J. Fraser (*Wallaces' Farmer, 36 (1911), No. 12, p. 573; Hoard's Dairyman, 42 (1911), No. 13, pp. 450, 451*).—Four different systems of dairy farming were compared, producing from 991 lbs. to 3,150 lbs. of milk per acre and returns of from $15.16 to $48.20 per acre.

[Dairying], MISS E. A. MAIDMENT (*Rhodesia Agr. Jour., 8 (1911), No. 3, pp. 423–434*).—Some notes on the general condition of the dairy industry in Rhodesia.

The cattle at the Kon-Kolodiesk Agricultural School, A. V. ABRIUTIN (*Selsk. Khoz. i Liesov., 234 (1910), Oct., pp. 234–246, figs. 3; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1910, No. 2, pp. 310, 311*).—An account of the dairy herd of the agricultural school of Kon-Kolodiesk.

The breeds represented are Simmental and crosses of this with native Russian breeds. The milk yield has been increased by careful selection for a number of years, while the average live weight has decreased. The average fat content for 15 years has been 4.5 per cent.

[Feeding experiments with dairy cows], E. BARNETT (*South Carolina Sta. Rpt. 1910, pp. 69–71*).—A brief report of the work in animal husbandry at the station.

In the study of the physiological effects of feeding cotton-seed meal in large amounts to dairy cows, it was found that 4 lbs. per head per day could be safely fed to mature cattle in connection with other feeds, but that when fed in amounts from 6 to 8 lbs. per head and day for periods of from 1 to 3 years the milk production was lessened, and it was thought to be the cause of mammitis and abortion.

The average cost of the feed for 17 cows was $57.23 per head per annum. The average yield of milk was 5,741 lbs., containing an average of 4.5 per cent fat.

[Milking machine] (*New Zeal. Dairyman, 15 (1911), No. 5, p. 15*).—A description of a new type of milking machine, said to be simple in construction and easily cleaned.

The cow's udder and the process of milk production, M. H. REYNOLDS (*Hoard's Dairyman, 42 (1911), No. 10, pp. 345–350, figs. 10*).—A popular account of the physiology of milk secretion and the structure of the tissues concerned.

[Milk secretion], K. BASCH (*Deut. Med. Wchnschr., 36 (1910), No. 21, pp. 987–990; abs. in Hyg. Rundschau, 21 (1911), No. 3, p. 175*).—From studies of the innervation of the mammary gland and experiments in transplanting the gland from the ventral to the dorsal side of dogs, the author concludes that milk secretion is not stimulated by means of the nervous system, but by a stimulating constituent of the blood. Injections of placental extracts also induced milk secretion. It is stated that this view is supported by the case of the Blazek sisters, who were connected twins but had separate nervous systems, and both of whom secreted milk after one of them had given birth to a boy.

Investigations on the milk production of rutting cows, E. WEBER (*Milchw. Zentbl., 7 (1911), No. 1, pp. 1–19*).—In only a few instances was the yield of milk or the percentage of fat reduced during the rutting period from that of a normal condition. As a rule there was no change in the taste, appearance, or character of the milk, except that it did not coagulate readily upon boiling. Whenever the cow was unduly excited there was a high percentage of acidity, and sometimes the milk was exceptionally yellow in color.

A bibliography is appended.

Milk from slop-fed cows, A. ROLET (*Lait. et Indus. Ferme [Paris], 20 (1910), No. 12, pp. 89, 90*).—This is an unfavorable view concerning the use of distillery slop for feeding dairy cows, on the ground that on feeding large quantities the flavor, odor, and acidity of the milk are affected. The opinion is expressed that milk coming from cows fed distillery slop should never be labeled "sanitary milk."

Effect on milk of water or watery food given to cows (*Mark Lane Express, 105 (1911), No. 4144, p. 269*).—Periodical doses of common salt administered to cows, even to the extent of purging, did not cause the consumption of excessive quantities of water. The amount of water consumed by the cows appeared to have no direct bearing on the composition of the milk.

Prevalent rain-bearing winds and the milk supply of Manchester during the years 1896–1909, W. GORDON (*Brit. Med. Jour., 1911, No. 2618, pp. 482–485*).—The author, having previously determined that rain-bearing winds are a factor in increasing the mortality in human tuberculosis, reports a study of the relation between rain-bearing winds and bovine tuberculosis. The data used were those furnished by Delepine in an article previously noted (E. S. R., 23, p. 81).

By subdividing the regions which furnish milk to the city of Manchester, England, the author found, as anticipated, that the least exposed districts showed a lower percentage of farms with tuberculous cows.

Effect of boric acid on milk (*Rpt. Govt. Bur. Microbiol. N. S. Wales, 1909, pp. 124–130; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 24, p. 1470*).—A study of the effect of adding different proportions of boric acid to milk showed that 400 grains or more of boric acid per pint would be needed to sterilize the milk. The only notable effect produced by the addition of 10 grains was to prevent or check the development of bacteria and thus delay souring and allow putrefactive changes to take place more rapidly.

Homogenized milk, H. DE ROTHSCHILD, trans. by J. H MONRAD (*N. Y. Produce Rev. and Amer. Cream., 31 (1911), No. 17, pp. 600, 601*).—A review of investigations and a discussion of the advantages of homogenizing or "fixing" milk.

Champagne milk (*Jour. Agr. Prat., n. ser., 21 (1911), No. 6, p. 179*).—A process is described for charging milk with carbon dioxid by fermenting with a champagne yeast.

Utilization of whey for dietetic purposes, F. T. BOND (*English Patent 26,168, Nov. 12, 1909; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 24, p. 1470*).—A note is given on a patented process by which the whey may be so concentrated under atmospheric or reduced pressure as to form a sirupy liquid, or a solid mass that may be ground and the powder pressed into tablets. Or the whey may be sprayed into a current of air having a temperature of about 300° F. and the finely divided dry powder thus obtained pressed into tablets.

Process and apparatus for sterilizing milk and milk products, E. WIENER (*English Patent 19,621, Aug. 22, 1910; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 3, p. 149*).—A description of a patented process and apparatus for sterilizing milk and its products by means of ozone.

[The temperator], J. H. MONRAD (*N. Y. Produce Rev. and Amer. Cream., 31 (1911), No. 17, p. 598, figs. 2*).—An apparatus for the regulating of the heat in the pasteurizer is illustrated and described.

Heating milk, F. W. CULBERTSON ET AL. (*N. Y. Produce Rev. and Amer. Cream., 31 (1911), No. 21, pp. 738–740*).—A symposium on the machines recommended for heating milk before running through the separator, and the temperatures used.

Composition of the milk of sheep in the region of Roquefort, R. MARTIN (*Ann. Falsif., 4 (1911), No. 28, pp. 86–88, figs. 3*).—Analyses are reported of sheep's milk for the different calendar months from February to July, 1910.

Rules relative to testing dairy cows (*Massachusetts Sta. Circ. 28, pp. 6*).—A revision of Circulars 9 and 15, previously noted (E. S. R., 20, p. 374).

Notice of judgment (*U. S. Dept. Agr., Notice of Judgment 753, p. 1*).—This relates to the adulteration of milk.

Clean milk and public health, J. D. BURKS (*Ann. Amer. Acad. Polit. and Soc. Sci., 37 (1911), No. 2, pp. 192–206*).—A popular article in which statistical data are presented showing the importance of a pure milk supply. The methods of obtaining pure milk and of regulating the milk supply of cities are discussed.

Report of milk inspector for the year 1909–10, J. O. JORDAN (*Reprint from Ann. Rpt. Health Dept. Boston, 38 (1909), pp. 62, pls. 8, charts 2*).—This contains information on inspection of dairy farms and places where milk is sold at wholesale and retail. The results of a bacterial examination of over 6,000 samples of market milk are reported and discussed in detail.

Milkmen's cooperative association, M. G. KAINS (*Amer. Agr., 86 (1910), No. 21, pp. 496, 497*).—A method is outlined for forming organizations of milk producers in order to reduce the cost of delivering milk in the city. The information is based on the results of 10 years' success of an organization in Erie, Pa.

Cooperative dairy farming in England, T. REECE (*Hoard's Dairyman, 42 (1911), No. 10, p. 354*).—This relates to the work of the Eastern Counties Dairy Farmers' Cooperative Society, recently organized in Wiltshire, England.

[Danish cooperative dairy associations], J. H. MONRAD (*N. Y. Produce Rev. and Amer. Cream., 31 (1911), No. 17, p. 594*).—A note on the amount of business done by the Danish associations engaged in exporting butter.

Butter making on the farm, J. M. TRUEMAN (*Connecticut Storrs Sta. Bul. 65, pp. 191–210, figs. 7*).—The advantages of making butter over those of selling milk are pointed out. Directions are given for separating cream and making and marketing butter.

Certified butter in California, J. N. FORCE (*Jour. Amer. Med. Assoc., 56 (1911), No. 11, p. 834*).—Because tuberculosis germs were found in so many samples of high-grade butter, a score card was devised for butter factories similar in scope to that for city milk plants, and giving due credit for pasteurizing apparatus and its use. A law recently enacted by the California legislature, giving to the medical milk commissions authority to certify butters free from pathogenic organisms, is discussed.

Twenty-third annual report of the Bernese Dairy School at Rütti-Zollikofen, A. PETER ET AL. (*Jahresber. Molk. Schule Rütti-Zollikofen, 23 (1909–10), pp. 54*).—This report contains a general account of the activities of the station, and reports experiments in the manufacture of butter and cheese.

A. Peter and G. Koestler continued their study (E. S. R., 21, p. 678) on the relation of milk constituents to the composition of Emmental cheese. The average figures for 10 normal cheeses, 8 of which were made in September, were as follows: Amount of milk used 969 kg., with fat 3.73 per cent and total solids 12.7 per cent; weight of green cheese 97.3 kg., of ripened cheese 89.1 kg.; fat content in cheese 33.54 per cent, total solids 65.75 per cent; ratio of the fat content of the milk to the fat content of the total solids in the ripened cheese 1:13.67, ratio of the solids in the milk to the yield of cheese 1:0.729; fat content of the whey 0.49 per cent. These results agree closely with those obtained in previous years. There appears to be a direct relation between the total solids in the milk and the yield of cured cheese and the approximate yield can be obtained by multiplying the total solids in the milk by 0.7.

There was a constant relation between the fat content in the milk and that in the cheese, but relatively more fat was lost in the whey when the milk had a high fat content. It is suggested that the percentage of fat in the cheese can be estimated from the fat content of the milk by multiplying the fat content of the milk by a variable factor. The following factors are proposed: For 3 per cent milk 14.5, for 3.4 per cent 14, and for 3.8 per cent 13.5. The fact that when working with a rich milk the yield is increased relatively more than that indicated in the fat percentage is accounted for because such cheese contains a larger amount of water. Cheese makers are recommended to make cheese from milk testing about 3.4 per cent of fat, as there is less loss in weight unless a cheese made from a milk low in fat is sold when fresh.

Koestler and J. Held make a preliminary report on investigations with Tilsit cheese, which were conducted along the same lines as the work with Emmental. The average results obtained from 6 lots of cheese, made in May, were as follows: Amount of milk used 330 kg., with fat 3.12 per cent and total solids 12.16 per cent; weight of fresh cheese 36.67 kg., of ripened cheese 33.5 kg.; weight of green cheese per 100 kg. of milk 11.1 kg.; fat in cheese 29.96 per cent; total solids 57.9 per cent; ratio of the fat content of the milk to the fat content of the total solids in the cheese 1 : 14.98; ratio of the solids in the milk to the yield of ripe cheese 1 : 0.833.

Early spring cheese, F. W. Culbertson et al. (*N. Y. Produce Rev. and Amer. Cream., 31 (1911), No. 21, pp. 754, 755*).—A symposium by practical cheese makers as to overcoming the defects in cheese which are so common in March and April.

Investigations of the Swiss type of cheese made in the Caucasus, S. M. Weller (*Ztschr. Analyt. Chem., 50 (1911), No. 2, pp. 87–89*).—The average analysis of 18 samples of cheese was found to be as follows: Water 31.12, fat 36.71, protein 25.13, ash 4.76, lactic acid 1.09, milk sugar 0.97 per cent.

Laguiole cheese, J. H. Monrad (*N. Y. Produce Rev. and Amer. Cream., 31 (1911), No. 17, pp. 608, 609*).—The method of making this cheese, which is a species of Cantal, is described in detail.

Heating apparatus for cheese makers, G. A. Witt (*Die Heiztechnischen Einrichtungen der Käserei. Bern, 1911, pp. 669, figs. 637; rev. in Molk. Ztg. [Hildesheim], 24 (1910), No. 92, p. 1733*).—This is a comprehensive and systematic treatise on methods of heating the curd and supplying heat to all parts of the cheese factory. Details are given of different kinds of heating apparatus and all accessory appliances such as kettles, vats, and other necessary factory equipment. The work is designed for students, teachers, and practical cheese makers.

There is a bibliography which includes trade catalogues and patent literature, as well as books and articles on dairying.

Arranging machinery, H. H. Burton et al. (*N. Y. Produce Rev. and Amer. Cream., 31 (1910), No. 9, pp. 310–312, figs. 3*).—Several floor plans for creameries are illustrated and described.

VETERINARY MEDICINE.

Handbook of comparative microscopic anatomy of domesticated animals, W. Ellenberger (*Handbuch der vergleichenden mikroskopischen Anatomie der Haustiere. Berlin, 1911, vol. 2, pp. VIII+622, figs. 391*).—In this second volume (E. S. R., 19, p. 376), which consists of articles by a number of authors, the circulatory apparatus is dealt with by H. Baum (pp. 1–148); the pituitary and pineal bodies, by A. Trautmann (pp. 148–176); the structure of the central nervous system, by H. Dexler (pp. 177–240); the uropoietic apparatus, by J. Tereg (pp. 241–279); and the organs of generation, by R. Schmaltz (pp. 280–662).

A text-book of veterinary pathology, A. T. Kinsley (*Chicago, 1910, pp. VIII+400, inserts 5, figs. 205, table 1*).—This book, prepared for students and practitioners, contains the following topics: Definitions—the cell; general consideration of disease—table of vegetable parasites, Saccharomyces, Schizomycetes, animal parasites (Protozoa, Helminthes, and Arthropoda); immunity; malformations; circulatory disturbances—hemorrhage, lymphorrhagia, edema (dropsy or hydrops), thrombosis, embolism, ischemia, and hyperemia (passive and active); inflammation; progressive tissue changes; retrogressive tissue changes; necrosis and death; tumors; fever; infective granulomata; glossary.

Veterinary medicine and surgery, E. F. JARREL (*Cincinnati, 1911, pp. 244, pl. 1*).—A work intended for use by the student and stockman.

Text-book of toxicology for veterinarians, E. FRÖHNER (*Lehrbuch der Toxikologie für Tierärzte. Stuttgart, 1910, 3. ed., pp. XI+391*).—A revised edition of this work.

New and nonofficial remedies, 1911 (*Jour. Amer. Med. Assoc., 56 (1911), No. 15, pt. 2, pp. 79*).—This work contains the medicinal substances examined prior to January 1, 1911, by the council of pharmacy and chemistry of the American Medical Association, and which appeared to comply with the rules of the council.

Drug therapy of the present time, M. KAHANE (*Die Arzneitherapie der Gegenwart. Berlin and Vienna, 1910, pp. VIII+603*).—This is a description of, and a discussion in regard to, the newer remedies.

Ehrlich's biochemical theory; its conception and application, L. H. MARKS (*Jour. Amer. Med. Assoc., 55 (1910), No. 23, pp. 1974–1978*).—A general review of Ehrlich's work in chemo-therapy.

South African poisonous plants, L. H. WALSH (*Cape Town, 1909, pp. 54, figs. 16*).—Notes on South African plants poisonous to stock, with particulars of symptoms and treatment.

In regard to the color-chemical method of detecting some oxidizing substances of the body, W. LOELE (*München. Med. Wchnschr., 57 (1910), No. 46, pp. 2414–2416*).—A consideration of some of the chemical factors involved in the staining of tissues and color reactions obtained with normal and pathological body fluids.[a]

In regard to the bactericidal power of yeast and cereal maceration extracts, A. FERNBACH and E. VULQUIN (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 15, pp. 656–658; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 7, p. 821*).—The authors in their previous work have shown the bactericidal power of yeast maceration extracts to be due to the presence of volatile bodies which have the characteristics of amins. This work, which was done with cereal extracts, indicates that the active principle here involved is different from that which exists in yeast.

In regard to the agglutination of Micrococcus melitensis by normal serum, L. NÈGRE (*Compt. Rend. Soc. Biol. [Paris], 69 (1910), No. 37, pp. 564, 565*).—The author found that in certain instances an agglutination was obtained with normal serum. He therefore recommends a procedure in which this error may be eliminated.

Sera of certain diseases which agglutinate both the Micrococcus melitensis and the typhoid bacillus, L. NÈGRE (*Compt. Rend. Soc. Biol. [Paris], 69 (1910), No. 38, pp. 631–633*).—The author found that serum from typhoid cases agglutinated the *M. melitensis*, and that the sera from cases of Malta fever were capable of agglutinating the typhoid bacillus.

In regard to the relation of bacterial precipitins to agglutinins, S. AMIRADŽIBI and KACZYNSKI (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 6 (1910), No. 5, pp. 694–702; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 48 (1911), No. 12, pp. 361, 362*).—The mixing test was found to be less sensitive than the layer test when high-power sera were examined. On the other hand, the layer test was unsatisfactory with low power rabbit sera, particularly so because positive results were obtained with heterologous extracts. Normal sera were also found to give a layer test with bacterial extracts.

---

[a] München Med. Wchnschr., 57 (1910), No. 26, pp. 1394, 1395.

The authors were unable to note an earlier formation of precipitins than agglutinins. Nor were they able to note that the serum of a rabbit which had been infected for 24 hours contained only agglutinogen (E. S. R., 23, p. 584).

The quantitative changes in the protein in the blood plasma of horses in the course of immunization, R. B. Gibson and E. J. Banzhaf (*Jour. Expt. Med., 12 (1910), No. 3, pp. 411–434; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 15–16, pp. 720, 721*).—The authors determined the various protein fractions in the oxalate plasma from 11 horses during the course of immunization.

An experimental study of opsonic immunity to Staphylococcus aureus, J. C. Meakins (*Jour. Expt. Med., 12 (1910), No. 1, pp. 67–81, charts 3; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 5 (1910), No. 19, p. 759*).—Injecting killed cultures of *S. aureus* into rabbits yields an opsonic immunity of high degree, which protects against living virulent staphylococci. This protection is in direct proportion to the amount of opsonins present in the serum. Repeating the injection very often diminishes its opsonic capacity. These opsonins are very active toward homologous strains but only slightly so toward the heterologous strains.

In regard to complement binding in helminthiasis and the chemical nature of the tapeworm antigen, K. Meyer (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 7 (1910), No. 6, pp. 732–747*).—The results show that aqueous and alcoholic tapeworm extracts give a complement binding reaction. These same complement binding antibodies can be produced by immunizing rabbits against tapeworm extracts. On the other hand, the complement binding reaction is very often negative with echinococcus extracts. By immunizing rabbits with echinococcus extracts, antibodies can be produced which act only slightly, or not at all, with cystic fluid; this is not the case with man.

Complement binding antibodies are not specie specific, but rather genus specific. The active antigen of the tapeworm extract is not a proteid body but a lecithin-like lipoid. It does not yield a protein reaction and is not attacked by pepsin and trypsin. It is soluble in ether, alcohol, and benzol, but is insoluble in acetone and is decomposed by lipase.

A chemical study of Sclerostomum equinum, T. Bondouy (*Arch. Par., 14 (1910), No. 1, pp. 5–39*).—This is a biochemical study of the parasite *S. equinum*.

From the results it is seen that this organism contains fats, fatty acids consisting chiefly of butyric acid, soaps, mucin, albumoses, purin bases and creatin, a ptomaine, a crystallizable alkaloid, an amino acid, and an amorphous substance containing nonprotein nitrogen and phosphorus which gives the precipitating reactions for an alkaloid. The cuticle of this parasite was also found to contain a unique protein combination which has no relation to chitin.

Contrary to the findings of Weinberg,[a] an alcoholic extract of the parasite was found to possess a strong hemolytic power. The soaps, fatty acids, crystallizable alkaloids, and ptomaines were active in the hemolytic process. The parasite further secretes a lipase which is capable of digesting the fat contained in horse serum. This lipase, according to the author, plays an active rôle in hemolysis. The bilirubin of horse serum is changed by the cellular activity of the parasite.

The specific meiostagmin reaction, M. Ascoli (*München. Med. Wchnschr., 57 (1910), No. 2, pp. 62, 63; abs. in Hyg. Rundschau, 21 (1911), No. 1, p. 24*).—This is a physical-chemical reaction, and is used by the author to determine

[a] Ann. Inst. Pasteur, 21 (1907), No. 10, pp. 798–807; Compt. Rend. Soc. Biol. [Paris], 63 (1907), No. 24, pp. 13–15.

the relation of the surface tension of an immune serum to the surface tension of an antigen. It is conducted with the aid of Traube's stalagometer (E. S. R., 23, p. 217), in which the serum of the patient, the antigen, and a normal serum diluted with an 0.85 per cent solution of sodium chlorid are compared in regard to the number of drops coming from the instrument under the same conditions and in a given period of time. The observations are made as soon as the apparatus is filled with the serum and again after 2 hours of incubation at 37° C.

Some results with typhoid serum are given.

Meiostagmin reaction with malignant growths, M. Ascoli and G. Izar (*München. Med. Wchnschr., 57 (1910), No. 8, pp. 403–405; abs. in Hyg. Rundschau, 21 (1911), No. 1, pp. 24, 25*).—The results show that diluted serum from rats affected with sarcoma when mixed with diluted sarcoma antigen has a lower surface tension than diluted normal rat serum. Some results are also given for cases of human sarcoma. The results with malignant growths were regularly positive.

Clinical experience with the meiostagmin reaction, G. Izar (*München. Med. Wchnschr., 57 (1910), No. 16, pp. 842–844; abs. in Hyg. Rundschau, 21 (1911), No. 1, p. 25*).—The reaction gave positive results in 34 out of 35 positive cases of tuberculosis. Other cases which had a positive cutaneous reaction, but a negative finding in regard to tubercle bacilli, were also positive. Cases of typhoid, ankylostomiasis, and echinococcus (7 pigs and 3 cows) also yielded positive results. On the other hand, sera from 2 subjects which had anthrax 2 months previous to the test gave negative results.

Alimentary anaphylaxis, C. Richet (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 2, pp. 44–46*).—Dogs which took crepitin through the alimentary tract were found to be strongly anaphylactic against an injection of crepitin.

Serodiagnosis of pregnancy, G. Lemaire and Laffont (*Compt. Rend. Soc. Biol. [Paris], 69 (1910), No. 31, pp. 337–339*).—The authors were not able to diagnose pregnancy with either the precipitin or the complement binding reaction, using amniotic fluid as the antigen.

A contribution to the etiology of Aujeszky's disease, Schmiedhoffer (*Közlem. Osszehasonl. Elet es Kortan Köreböl, 10 (1910), Nov. 5; abs. in Rev. Gén. Méd. Vét., 17 (1911), No. 196, p. 232*).—Observations made of this disease in bovines, cats, and dogs in Hungary are first reviewed. The author finds that the virus, which passes through very porous filters only, occurs in greatest abundance at the point of inoculation, next in the blood and in the central nervous system. The liver, spleen, and kidneys were at times found to be infectious, as was the urine in 2 or 3 cases. The resistance of the virus is very weak. Rabbits and guinea pigs are the most susceptible of the laboratory animals. The carnivora and ruminants are also very susceptible, solipeds being much less so, while the hog, pigeon, and fowl are refractory. The shortest incubation period is found in the rabbit in which it is less than 20 hours, the longest in the horse in which it is 10 days.

Treatment through the subcutaneous injection of antiseptic solutions at the point of inoculation, followed by the use of atoxyl and quinin, was ineffective. See also previous notes (E. S. R., 23, p. 288).

In regard to the dissemination of hog erysipelas by the Lorenz vaccine, Meyer (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 38, pp. 737–740*).—A polemical article in regard to Rickmann's work.[a]

Hookworm disease, G. Dock and C. C. Bass (*St. Louis, 1910, pp. 250, pl. 1, figs. 49*).—The etiology, pathology, diagnosis, prognosis, prophylaxis, and treatment of hookworm disease is dealt with.

---

[a] Berlin. Tierärztl. Wchnschr., 25 (1909), No. 35, p. 643.

In regard to the mastitis caused by streptococci, W. MEYER (*Arch. Wiss. u. Prakt. Tierheilk., 36 (1910), No. 6, pp. 583–633*).—The author studied a number of naturally infected and artificially infected cows, in which the patho-anatomical changes were noted in 4 naturally and 2 artificially infected animals. A study was also made of the morphological and biological characteristics of the various strains of streptococci isolated.

The work shows that chronic streptococcic mastitis begins as an acute condition, which is often of brief duration. It manifests itself patho-anatomically as a purulent catarrh of the ducts and the alveoli of the mammary gland, and shows in addition a marked increase in the connective tissue of the gland structure. The inflammation is not produced by the streptococci themselves, but by the metabolic products of these organisms. The milk obtained from such animals showed a diminished fat and acid content, an increased catalytic action, and a loss of the reducing (reductase) action. The specific gravity of the milk from chronic cases remains within normal limits. Therapeutically considered, the only effective measure lies in giving an injection of an antiseptic solution at the very earliest period of the disease; later injections do not prevent the destruction of the quarter involved. The streptococci when growing in the gland were found to produce short and interwoven bands, while those multiplying in bouillon formed long chains.

Foot-and-mouth disease, J. PAECHTNER (*Ztschr. Spiritusindus., 34 (1911), No. 2, pp. 13, 14*).—A general discussion in regard to the epidemiology, cause, and prevention of the disease.

Sporotrichosis in man and in the horse, R. L. SUTTON (*Boston Med. and Surg. Jour., 164 (1911), No. 6, pp. 179–181, figs. 4; abs. in Jour. Amer. Med. Assoc., 56 (1911), No. 8, p. 617*).—The author reports a case of sporotrichosis in man, confined to the wrist, which followed an injury that took place while the patient was repairing the manger of a horse suffering from sporotrichosis of the neck.

[Investigation of the stomach worm and hookworm disease in young cattle and lambs], E. BARNETT (*South Carolina Sta. Rpt. 1910, pp. 71, 72*).—A brief report of observations made in continuation of studies previously noted (E. S. R., 22, p. 681).

Time relationships of the wood tick in the transmission of Rocky Mountain spotted fever, J. J. MOORE (*Jour. Infect. Diseases, 8 (1911), No. 3, pp. 339–347*).—"The minimum duration of feeding necessary for a tick to infect a guinea pig was found to be 1 hour and 45 minutes. The average time necessary seems to be about 10 hours, while 20 hours were almost constantly infective. The duration of feeding necessary to infect a tick is approximately 25 hours, while the minimum incubation period in the tick was not definitely determined. With ticks obtained from nature it is possible that the duration of feeding necessary to infect the tick and the incubation period in the tick will be found to be much less than is indicated here."

Complement deviation in Rocky Mountain spotted fever, B. F. DAVIS and W. F. PETERSEN (*Jour. Infect. Diseases, 8 (1911), No. 3, pp. 330–338*).—"Positive deviation of complement, using spotted fever antigen and antibody, has been obtained in but one instance, and the results of experiments undertaken to confirm this positive finding have been negative."

Curative tests of Ehrlich-Hata "606" in spirochetosis of geese, bovine piroplasmosis, and rinderpest, E. DSCHUNKOWSKY (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 1, pp. 2–9; abs. in Jour. Compar. Path. and Ther., 24 (1911), No. 1, pp. 91–94*).—The author and a collaborator have previously shown (E. S. R., 24, p. 280) that atoxyl has a specific action in spirochetosis of geese. In the experiments here reported it was found that as in other spirochetoses "606" (dioxydiamidoarsenobenzol or salvarsan) has a much stronger spirocheticide action than has atoxyl.

When "606" and the spirochete virus were injected simultaneously, no noticeable symptoms of the disease appeared and the spirochetes could not be found in the peripheral blood. Although the virus employed killed control geese in 4 days, diseased geese were cured not only when injected 48 hours after being infected but also after 72 and even 96 hours, that is, even when administered only a few hours before death would otherwise have taken place. The disappearance of the spirochetes from the blood was observed to take place in from 10 to 30 hours after the injection of "606," depending upon the quantity administered. No great difference was observed as regards the visible action of different doses. The protective and curative power of "606" in this affection is estimated at 50 times that of atoxyl.

In experiments with piroplasmosis due to *Piroplasma bigeminum* 7 animals were employed, 3 being held as checks. The drug was found to dissolve large numbers of the piroplasms in a very short time, setting endotoxin free and resulting in an acute intoxication of the host. The author considers it probable that a substance will be found which when injected simultaneously with "606" will combine with the endotoxin and render it harmless to the host.

The author's experiments led him to conclude that "606" has no therapeutic value for rinderpest.

Experiments on the treatment of animals infected with trypanosomes, by means of atoxyl, vaccines, cold, X-rays, and leucocytic extract; enumerative methods employed, R. Ross and J. G. Thomson (*Proc. Roy. Soc.* [*London*], *Ser. B, 83* (*1911*), *No. B 563, pp. 227–234; Ann. Trop. Med. and Par., 4* (*1911*), *No. 4, pp. 487–527, charts 5*).—The experiments here reported are thought to be the first in which the effect of drugs has been measured through regular daily counts of the parasites by measured thick film methods.

The treatment of trypanosomiasis, with especial reference to surra, R. P. Strong and O. Teague (*Philippine Jour. Sci., B. Med. Sci., 5* (*1910*), *No. 1, pp. 21–53*).—The authors here consider the more important methods of treatment of trypanosomiasis under the headings of serum therapy and vaccination, and treatment with anilin and other dyes, with compounds of arsenic, with compounds of antimony, and with a combination of 2 or more drugs. Four series of experiments are reported which show conclusively that monkeys (*Cynomolgus philippinensis*) can be cured permanently of surra infection by a single injection of arsenophenylglycin.

Experiments with horses and mules in which 23 animals were employed are also reported. The authors state "that arsenophenylglycin has proved to be by far the most satisfactory means of treatment of trypanosomiasis yet discovered. . . . While the results in horses are the best that have as yet been obtained, they are not nearly as encouraging as in monkeys. We have, however, for the first time been able to cure horses afflicted with surra, and this we could never accomplish before by any other means. While it appears that we can save a certain percentage of the horses infected with surra during an epidemic, we can never predict with certainty whether in a given instance we will be able to cure the horse, or whether he will succumb first to the action of the drug."

A bibliography of 73 titles is appended.

Epidemiology of tuberculosis, R. Koch (*Ztschr. Hyg. u. Infektionskrank., 67* (*1910*), *No. 1, pp. 1–18, charts 7*).—This is the last contribution of the late Robert Koch, and treats of the epidemiology of human tuberculosis in various parts of the world.

The retrojugular glands for the early diagnosis of tuberculosis in experimental guinea pigs, G. KIRÁLYFI (*Berlin. Klin. Wchnschr., 47 (1910), No. 44, pp. 2015–2017, fig. 1*).—The author draws attention to the fact that invariably an early swelling or caseation of the lymphatic glands on the right and left sides of the incisura jugularis sterni is present in practically all instances and long before any other signs are manifest. He proposes to use this criterion for the detection of tuberculosis in the animal. An illustration is given.

The ligroin method for tubercle bacilli, L. LANGE and P. NITSCHE (*Ztschr. Hyg. u. Infektionskrank., 67 (1910), No. 1, pp. 151–158*).—Tubercle bacilli have a definite adhesive property toward ligroin, and this allows an easy separation of these bacilli from other bacteria and material. This article deals particularly with refuting[a] the question of the superiority of other methods.[b]

Tuberculosis of farm animals, C. F. BRISCOE and W. J. MACNEAL (*Illinois Sta. Bul. 149, pp. 317–431, figs 8*).—This review of the present status of our knowledge of tuberculosis includes reports of original investigations. Following a brief introduction, the authors deal with the pathology; general methods employed in determining the presence of the bacillus; examinations for tubercle bacilli of market milk and butter, of milk from tuberculous cows with sound udders, of feces, and of the blood of tuberculous animals; public health relations; distribution of tuberculosis among farm animals; and methods of combating animal tuberculosis.

In the experiments reported, it was found that "*Bacillus tuberculosis* remains alive in butter as ordinarily salted for a much longer time than butter is usually kept in storage. . . . Of the 6 samples of butter tested . . . 2, or 33⅓ per cent, contained tubercle bacilli virulent to guinea pigs."

"According to the literature reviewed, tubercle bacilli are very common in market milk, being found, in the 7,845 samples tabulated, 537 times, or 6.8 per cent. A composite of the 3 largest testings done in the United States in 1908 and 1909, those of Anderson (Washington), Fields (Louisville), and Hess (New York City), gives a total number of 447 samples, of which the number containing tubercle bacilli is 78, or 17.5 per cent. The 4 largest series of tests in Continental Europe, those of Mueller, Beatty, Smit, and Eber, comprise a total of 4,229 samples, and of these only 205, or 4.8 per cent contain tubercle bacilli. The testing of 37 samples of market milk from Champaign and Urbana, from 21 dairies, revealed no tubercle bacilli."

"Those investigators finding positive results and those finding negative results in testing milk of tuberculous cows with sound udders are about equal in number as shown by the literature cited. Though the question is yet unsettled whether tuberculous cows with sound udders secrete tubercle bacilli in their milk, the facts so far accumulated point to these conclusions: (a) Tubercle bacilli are rarely found in the milk of tuberculous cows with sound udders, especially if the infection is localized; (b) when a cow has extensive generalized tuberculosis or when the tubercle bacilli are free in the blood (as, for example, after injecting a pure culture of tubercle bacilli into a vein), at such times tubercle bacilli may be secreted along with the milk. We have tested for tubercle bacilli a total of 47 samples of milk from 10 tuberculous cows. All the cows at autopsy showed normal udders except one, [which] showed extensive induration in the right forequarter of the udder, but this change was not tuberculous in nature. In none of the 47 samples were any tubercle bacilli

---

[a] Ztschr. Hyg. u. Infektionskrank., 66 (1910), p. 315.

[b] Deut. Med. Wchnschr., 35 (1909), pp. 435, 1428, 1617; Hyg. Rundschau, 19 (1909), p. 699; Compt. Rend. Soc. Biol. [Paris], 67 (1909), p. 507.

found, and at autopsy none of the 10 cows was found to be very extensively tuberculous."

"At this station, 97 samples of feces from 62 tuberculous cattle have been tested for tubercle bacilli by inoculation of guinea pigs. Tubercle bacilli were found 4 times in samples from 3 animals."

"In the circulating blood of tuberculous cattle, tubercle bacilli have been found by good investigators, but their occurrence here would appear to be rather infrequent. In our own tests the results were wholly negative, but it should be remembered that the cattle tested were not in an advanced stage of tuberculosis."

"There is a great need of extending the excellent sanitary regulations of some of our large cities to the smaller cities and throughout the country generally. A system of popular education concerning tuberculosis, the tuberculin test, and health regulations would be of great benefit to the State."

"For handling the tuberculous cow one of the following methods is advised: (a) In advanced cases where there are physical signs of the disease or when the cow is not very desirable for breeding or dairy purposes, slaughter under inspection is best. (b) When it is desirable to keep the reacting cow for the purposes mentioned above, the Bang method is recommended especially to large stock owners. (c) For owners of smaller herds the modified Bang method by means of a stock owners' association, so the tuberculous animals may be farther removed from the healthy herd, is to be recommended."

Elaborate bibliographies follow the discussions.

Tuberculosis in the hog, S. Anderson (*Maanedskr. Dyrlæger, 21 (1910), No. 24, pp. 654, 655; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 52, p. 1053*).—Out of a total of 64,637 hogs examined in Odense, 3,039 were found tubercular. The distribution of tuberculosis in the animal body was as follows: In the lymphatic glands of the head, 1,121 cases; mesenteric glands, 882; head and mesenteric glands, 204; head, lungs, liver, and mesenteric glands, 358; head, lungs, liver, mesentery, and spleen, 45; head, lungs, and liver, 77; head, lungs, pleura, and mesentery, 11; head, lungs, liver, mesentery, and flesh glands, 100; head, lungs, liver, mesentery, and bones, 107; lungs, liver, and mesentery, 4; lungs and mesentery, 4; lungs, 29; head and liver, 3; head and lungs, 66; liver and mesentery, 9; lungs and liver, 4; head, liver, lungs, mesentery, and central nervous system, 1.

Experiments in connection with the treatment of cattle affected with redwater, with trypanblue, and trypanred, S. Dodd (*Vet. Jour., 66 (1910), No. 421, pp. 394–411*).—The author reports experiments conducted in Queensland to determine the value of these drugs in treating animals affected with virulent strains of the piroplasm.

He finds that while the injection of trypanred appears to have some effect in destroying the parasites in the blood of an animal affected with piroplasmosis, its effect in reducing the temperature in severe cases is uncertain. The effect of the drug in arresting the course of the disease in severe cases was found to be slight, even when animals were treated early. He concludes that the results obtained do not justify its further use in the field.

The several series of experiments with trypanblue here reported show it in the main to be an efficient remedy. "The most favorable results following its use, however, are seen when it is injected at an early stage of the disease. It may also be used with the anticipation of good results following when the fever is at its height, but if the disease has been in existence several days, not counting the period of inoculation—that is, the animal has been actually ill for some days—favorable results must not be looked forward to with too much confidence, for although, even in these cases, the drug exerts an undoubted effect upon the parasite, complications may have already set in, and when such is the case it is the latter which may ultimately cause the death of the animal. Although the results following the use of the drug in experimental cases have been very satisfactory, yet definite conclusions can only be drawn after the drug has been used for some time in the field on a large scale and over a large area." The results following the use of trypanblue in practice have so far borne out the experimental observations.

Causative agent of infectious abortion in bovines, Zwick (*Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 7, p. 810*).—The bacillus causing this condition was not found to be absolutely anaerobic. The aerobic phase can be acquired, and there are strains which are aerobic at the outset. The disease can be reproduced in goats and rabbits.

For the diagnosis of this condition, the agglutination test is of particular value, but the complement binding reaction also gives good results. The serum obtained from fetuses was not found to contain active substances. The author is making some tests with "abortin," which is prepared in the same manner as tuberculin.

The etiology of contagious abortion of cows, W. J. MacNeal (*Ill. Agr., 15 (1911), No. 6, pp. 8–14*).—The data here presented have been previously noted from another source (E. S. R., 24, p. 483).

Etiology and prophylaxis of an udder epizootic, R. Ostertag (*Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 7, p. 809*).—In an epizootic of young bovines the author isolated *Bacterium pyogenes bovis liquefaciens,* with which he was able to obtain positive results by inoculating it into animals. Repeated injections of this organism act as a protective, but are not without danger, because there is a tendency to produce thrombosis. The local treatment of the udder with killed bouillon cultures or extracts protects against an infection for from 2 to 4 weeks.

Johne's disease, D. B. Clark (*Amer. Vet. Rev., 38 (1910), No. 3, pp. 360–367*).—Four head in a herd of cattle in which this disease had been known to exist for 10 years, and which were tested in Wisconsin with tuberculin prepared from avian tubercle bacilli, gave a slight reaction but at post-mortem examination neither the bacilli nor the characteristic infiltration of epithelial cells were found. Three and one-half years is the longest time that the author has observed an animal to live after showing symptoms of intermittent scouring.

Eradication of the common cattle tick, A. Smith and J. C. Robert (*Bul. Miss. Live Stock Sanit. Bd., 1908, pp. 16, figs. 11*).—This bulletin presents the laws of the State of Mississippi relating to the control of the cattle tick and several brief popular accounts which emphasize the importance of its eradication.

The Texas fever tick.—Some actual results which have been accomplished in cattle tick eradication in Virginia, J. G. Ferneyhough (*South. Planter, 72 (1911), No. 3, pp. 290, 291*).—It is stated that by April 1, 1911, all but 6 of the counties quarantined for cattle ticks in Virginia would have been released.

Worm nests in cattle due to Filaria gibsoni, J. B. Cleland and T. H. Johnston (*Jour. Compar. Path. and Ther., 23 (1910), No. 4, pp. 335–353; Rpt. Govt. Bur. Microbiol. N. S. Wales, 1909, pp. 91–99*).—This detailed account includes references to the literature relating to the subject (E. S. R., 23, p. 588).

Heavy loss of cattle from the effects of Œsophagostoma inflatum, D. F. Lucky (*Amer. Jour. Vet. Med., 6 (1911), No. 1, pp. 367–369*).—The author here reports an outbreak of *O. inflatum* in a herd of 102 yearlings that had been shipped to southeast Missouri in February, 1910, for grazing purposes. Upon examining the herd on September 15, 22 head were found to be dead and the others in a very poor condition, although they had had access throughout the summer to good pasture with plenty of clover.

Several similar outbreaks in the State of Missouri in the spring of 1904 are mentioned, as follows: "In 1 outbreak in a herd of 36 head in Jasper County, 23 head died and the remaining 13, mostly cows, were left in a very poor condition. One outbreak in Grundy County in a herd of 320 head of grade and full-blood Aberdeen-Angus cattle, resulted in the death of 83 head. In 1 neighborhood in Gentry County 40 different farmers had cattle affected with this worm, and lost by death from 1 to 34 head each. The amount of the loss from the emaciation of the cattle that lived was equal to the loss by death."

It is said that this worm spreads quite rapidly from one animal to another. In all the outbreaks in the larger herds the disease was definitely traceable to some infested animal getting into the pasture or being added to the herd. An account is given of the symptoms and the results of post-mortem examinations. It is recommended that infested animals be removed from infested pastures and supplied with nutritious feed. In many badly affected animals very satisfactory results were secured by withholding food from the animals for 24 hours and then administering a cathartic, following with a full dose of gasoline and sweet milk.

Gastritis due to trichostrongyle invasion.—Cases in adult cattle, J. A. Gilruth and Georgina Sweet (*Vet. Jour., 66 (1910), No. 421, pp. 418–421*).—The authors report having found parasites very similar to the *Ostertagia ostertagi* of Stiles present in large numbers in a herd of milch cows. The treatment of affected animals with lysol and tonics internally resulted in a gradual return to a normal condition.

About white scours in calves, C. Titze (*Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 7, p. 810*).—Various bacteria were found to be present in addition to the abortion bacillus (Zwick). Bacteria-free blood filtrates were not found to be pathogenic. Vaccination tests which were made resulted negatively.

In regard to braxy or bradsot in sheep, C. Titze and A. Weichel (*Arb. K. Gsndhtsamt., 36 (1910), No. 2, pp. 171–197*).—According to the authors, the bacillus usually known as the bradsot bacillus is not an etiological factor in this disease. They consider it to be saprophytic and as belonging to the group of anaerobic cadaver bacteria.

Bradsot or braxy can therefore only be diagnosed by the autopsical findings. The authors in this work were not able by direct transference to convey the disease, nor was it possible to relate such factors as bad water, condimental foods, and roughage to the causation of this condition.

Some points in the epizootiology of sheep scab in relation to eradication, S. Stockman (*Jour. Compar. Path. and Ther., 23 (1910), No. 4, pp. 303–314*).—In discussing this subject the author reports experiments personally conducted. The questions relating to the epizootiology of sheep scab which he points out as requiring further investigation include (1) the period of time after removal from affected sheep during which the acari and their eggs are capable of infecting other sheep; (2) the length of time during which the acari or their eggs may remain in a quiescent state upon sheep and subsequently give rise to scab; (3) the period of time after what may be called ineffective dipping in which one may expect the active symptoms of scab to reappear; and (4) whether there is anything in connection with the habits of the parasite or the general conditions of the sheep which can account satisfactorily for the almost complete disappearance of scab during the summer months.

Septicæmia pluriformis ovium, MIESSNER and SCHERN (*Arch. Wiss. u. Prakt. Tierheilk., 36 (1910), Nos. 1, pp. 44–96; 2, pp. 208–244; abs. in Rev. Gén. Méd. Vét., 15 (1910), No. 180, pp. 705, 706*).—In the first paper, following a review of the literature, a number of cases are reported. An account of the affection, including symptoms and pathological anatomy, is then given, with a report of experimental studies of the cause and nature of the disease, etc. The second paper takes up methods of combating the disease. The cultural and biological properties of the bacillus are said to place it in the septicemia pluriformis group. Three forms of the disease, acute, subacute, and chronic, are described.

Treatment of dourine with trypanred and with arsenical preparations, W. L. YAKIMOFF (*Bul. Soc. Path. Exot., 4 (1911), No. 2, pp. 116, 117*).—The treatment of 4 stallions suffering from dourine with trypanred alone and associated with arsenical preparations did not give satisfactory results.

A report upon 112 horses satisfactorily treated by the new operation for roaring or whistling, F. HOBDAY (*Vet. Jour., 67 (1911), No. 427, pp. 4–22, figs. 5*).—In performing this operation the author now strips both ventricles, operating through the crico-thyroid ligament only, and without using a saw to cut the thyroid cartilage or the scalpel to cut the cricoid or tracheal rings.

Metabolism of dogs with functionally resected small intestine, E. P. UNDERHILL (*Amer. Jour. Physiol., 27 (1911), No 4, pp. 366–382; abs. in Jour. Amer. Med. Assoc., 56 (1911), No. 8, p. 618*).—From experimental observations conducted it is apparent that as much as 39 per cent of the small intestine of a dog may be resected without causing significant detrimental changes in the utilization of the various foods, and the animal may gain in weight.

The verminous dermatoses of the dog, L. G. NEUMANN (*Rev. Vét. [Toulouse], 36 (1911), No. 2, pp. 76–83*).—A review of the present knowledge of the subject.

A cerebral embolism caused by Strongylus vasorum, CAPDEBIELLE and HUSSENET (*Rev. Vét. [Toulouse], 37 (1911), No. 3, pp. 145–147, fig. 1*).—A cerebral embolism in a fox terrier of 15 months is reported upon.

Some observations on a laboratory epidemic, principally among dogs and cats, in which the animals affected presented the symptoms of the disease called distemper, J. P. M'GOWAN (*Jour. Path. and Bact., 15 (1911), No. 3, pp. 372–380*).—The author deals with the "bacteriology and pathological anatomy of a disease found to be epidemic in several varieties of animals, which, among dogs, was characterized by the following symptoms: Watering at eyes, epiphora, purulent discharge from eyes, corneal ulcers; serous at first, later purulent, discharge from the nose; sneezing, coughing; vomiting, diarrhea; rise of temperature; occasionally abdominal rash; dullness, anorexia, emaciation, paralysis, chorea, interstitial keratitis."

Concerning an epizootic among cats caused by an organism of the hemorrhagic septicemia group, Z. BOUČEK (*Centbl. Bakt. [etc.], 1. Abt., Orig., 53 (1910), No. 3, pp. 279–293; abs. in Jour. Roy. Micros. Soc. [London], 1910, No. 4, p. 497*).—During the course of a very fatal epizootic among cats in Bohemia during 1908–9, the author made studies of the organism concerned.

From the blood and various organs a small ovoid, nonmotile, nonsporulating, Gram-negative bacillus, which showed well marked polar staining, was obtained. The organism, to which the name *Bacillus felisepticus* is given, grew readily upon ordinary media and the feeding and inoculation of pure cultures proved fatal to kittens and mice. A young cat was immunized against the organism through inoculation of the bacillus of rabbit septicemia.

In regard to anthrax infection in birds by feeding, O. HOFHERR (*Centbl. Bakt. [etc.], 1. Abt., Orig., 55 (1910), No. 6, pp. 434–464*).—In order to determine whether certain deaths in ducks were caused by the anthrax bacillus, the author conducted feeding tests with this organism and ducks, chickens, and pigeons.

The results show that birds are relatively nonreceptive to anthrax infection, as only 7 out of 29 birds succumbed to it. The body fluids of the chickens seemed to have an extraordinary capacity for destroying the anthrax bacillus. In the infected animals no absolute immunity seemed to remain behind.

A bibliography of 43 titles is appended.

The leg mange of birds, T. HAIDUCK (*Rev. in Deut. Tierärztl. Wchnschr., 18 (1910), No. 13, p. 197; Vet. Rec., 23 (1910), No. 1173, p. 408*).—The author considers the marked proliferation of horn in this disease to be indicative of an active stimulation of epithelial growth that can not be explained by the mechanical irritation of the parasite alone. He attributes it to the influence upon the epithelium of toxic substances excreted by the mites. Experimental transmission of the parasite gave negative results. Having tested various agents he recommends oleum carvi in the form of an ointment, 1:5.

New investigations of Leucocytozoon sabrazesi and L. caulleryi of the domestic fowl of Tonkin, C. MATHIS and M. LEGER (*Bul. Soc. Path. Exot., 3 (1910), No. 8, pp. 504–510, fig. 1*).—During the period from July, 1909, to September, 1910, the authors examined 1,148 fowls, finding 28 infected by *L. caulleryi* and 226 infected by *L. sabrazesi*. A double infection was observed in 3 cases. They also examined 196 ducks, 72 geese, 23 turkeys, 35 guinea fowls, and 253 pigeons without finding either of the parasites.

Experimental leukemia in chickens, II, V. ELLERMANN and O. BANG (*Ztschr. Hyg. u. Infektionskrank., 63 (1909), No. 2, pp. 231–272, figs. 2; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 50, p. 1001*).—Continuing earlier work (E. S. R., 20, p. 286), the authors were able by the intravenous injection of an emulsion of the organs of fowls afflicted with leucosis to produce the typical condition in chickens. Doves, turkeys, rabbits, and guinea hens could not be infected. The incubation time was found to be from one to two months. The infective agent is considered an ultrafilterable virus.

White diarrhea in chickens, its causes, and treatment, W. WESTPHAL (*Deut. Landw. Geflügel Ztg., 1910, No. 44; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 50, p. 1001*).—The author believes the cause of this disease to lie chiefly in the strain of the bird, in unsystematic and bad feeding, and in improper care of the chicks. Only birds which are at least 2 years old and fully grown should be employed for breeding purposes. Another cause is supposed to be the insufficient absorption of the contents of the yolk sack, this being due to some fault arising during artificial incubation. After leaving the shell the condition may also be brought about by giving food a little too early. According to the author, food should only be given after from 48 to 72 hours, and should consist of corn, wheat, oats, and from 3 to 10 per cent of meat or fish meal.

How to prevent and cure white diarrhea in chickens, F. L. PLATT (*Rel. Poultry Jour., 17 (1911), No. 11, pp. 1154, 1164–1168*).—This is a popular description of this subject, and also of work previously noted (E. S. R., 20, pp. 386, 496).

Studies in regard to the penetration of formaldehyde, P. LASSABLIÈRE (*Arch. Internat. Pharmacod. et Thér., 20 (1910), No. 1–2, pp. 5–36*).—This is a physical and bacteriological study of the penetrating powers of formaldehyde, with particular regard to its use as a disinfectant.

The author points out that the penetration is dependent on 5 factors, namely, the temperature of liberating the gas, the humidity of the atmosphere, the time of exposing the gas to the objects, their temperature, and the size of the room. The vaporizing apparatus was found most effective when operated at a temperature between 160 and 175° C. The penetration of the objects by the gas was found to begin in about 3 hours after commencing the exposure.

Disinfection for all practical purposes can be attained in from 5 to 7 hours for all room and general superficial purposes, but books and mattresses require 24 hours at a temperature of from 18 to 28°. The gas is absolutely efficient under these conditions for destroying *Bacillus typhosus*, *B. diphtheriæ*, and the staphylococcus, but is not certain with spores, particularly the spores of *B. subtilis*. Disinfecting rooms, books, mattresses, etc., at a temperature below 10° is not possible. At from 10 to 18° it is just apparent but rather inconstant, while from 18 to 30° the penetration is absolutely efficient for rooms, carpets, and most other objects. Perfect disinfection of mattresses and books can be secured at 50 to 60°.

The effect of certain reagents on hides, W. F. COOPER and W. H. NUTTALL (*Jour. Econ. Biol., 5 (1910), No. 4, pp. 157–159*).—The authors state that the application of picric acid, pyridin picrate, and mercury bichlorid does not interfere with the tanning process or affect the color of the tanned pelt. "As far as any objection to tanning is concerned, there is no reason why a large number of other dyes and chemicals should not be tried as a means of controlling and preventing . . . infestations by many pests."

RURAL ENGINEERING.

Second progress report of cooperative irrigation investigations in California, F. ADAMS (*U. S. Dept. Agr., Office Expt. Stas. Circ. 108, pp. 39*).—This circular continues the report of the irrigation investigations carried on by the Office and the State of California (E. S. R., 16, p. 930). It discusses the water-right situation in California, including recent legislation in other States and needed changes in California, describes the present status of irrigation development in the State, and reports duty of water determinations, investigations of irrigation by pumping, studies of water distribution and delivery, the use of concrete in irrigation, the application of water to crops, seepage losses from canals, the cleaning of canals, the drainage of irrigated lands, and the status of investigations now under way.

In experiments to determine the duty of water on various standard crops in the State at large it was found that the duty on alfalfa varied from 1.40 ft. to 8.60 ft. On citrus fruits in southern California the duty varied from 0.80 ft. to 2.43 ft.

On the experiment farm at Davis 8 plats of alfalfa which received no irrigation yielded 4.08 tons per acre, while 22 plats which received 12, 24, 30, 36, and 48 in. of water yielded respectively 4.79, 6.43, 8.09, 7.60, and 8.45 tons per acre. Experiments in irrigating barley and corn showed large increases in yield with the application of relatively small amounts of irrigation water.

Complete tests were made of 38 pumping plants in the vicinity of Pomona and Riverside and fuel and water tests of 100 others. The complete tests showed that the efficiency of the gasoline-driven plants varied from 30 to 50 per cent and that of electrically-driven plants from 40 to 55 per cent. The partial tests showed a greater economy in fuel consumption in the larger than in the smaller plants and a striking variation in fuel consumption in the different plants.

Measurements of seepage losses from canals showed that the losses varied from 0.17 to 51.50 per cent per mile, and averaged 5.93 per cent.

Irrigation investigations at Koppenhof, 1910, E. KRÜGER (*Mitt. Kaiser Wilhelms Inst. Landw. Bromberg, 3 (1911), No. 3, pp. 175–183, pl. 1*).—From results of experiments on fertilized and unfertilized fields planted to potatoes, the author draws the following conclusions:

Fertilizers, without irrigation, gave a profitable increase in yield. Irrigation without fertilization gave an increase in yield in one instance only, there being, on an average, no increase in yield. A short-period irrigation (51 days) was as efficient as, and even more so than, a long-period irrigation (97 days), the later irrigation giving no increase but rather a reduction in yield. The time of irrigation seemed to be of great importance in the production of potatoes, results of earlier investigations favoring the first of June rather than July for the first application. As in previous experiments an increase in water gave an increase in yield, but in direct proportion. Irrigation, but not fertilization, increased the percentage of large potatoes in the crop, and almost without exception increased the starch content of the potatoes individually, as well as the total starch content and the percentage of plant food assimilated. Owing to the abundant rainfall of the year (330.7 mm. in 48 rainy days from May to September) the effects of irrigation were not so marked as they might be in a drier year.

The reclamation of seeped and alkali lands, C. F. BROWN and R. A. HART (*Utah Sta. Bul. 111, pp. 75–92, figs. 8*).—This bulletin gives the results of drainage operations carried on in cooperation with this Office at Huntington, Emery County, Utah, from 1906 to 1910, and also at several points in western Colorado, where the peculiar structure and condition of the soil have made the reclamation of seeped lands extremely difficult. The Huntington experiment is described in detail and the beneficial results from drainage are set forth.

Following this is given a condensed set of recommendations intended to cover the general conditions as found throughout the Colorado plateau, among these being the following: The exact source of water supply should be determined for the field being examined, by means of auger borings and test pits. If the source is in underground shale knolls, drains not less than 5 ft. deep from some suitable outlet through the natural course of seepage should be laid directly into the shale knolls. The deeper the drain in the shale, the better the results. To avoid expensive construction, drainage should be undertaken as soon as seepage makes its appearance, but even localities that have already been seeped for a long time may usually be successfully reclaimed. To clean out the drainage system after completion, it is advisable to turn irrigation water in at the head. It is also well to arrange a permanent flushing box at the upper end of all drains for this purpose. Vigorous cultivation in the fall, to give the rains and snows an opportunity to leach out the alkaline salts deposited on the surface is one of the first steps toward reclamation, and more cultivation in the spring, followed by a liberal application of irrigation water, is another important factor. Alkali-resistant crops should be planted. Care must be taken not to irrigate directly over the drain lines, and where an irrigation ditch crosses a drain a flume should be provided. The cost of draining small tracts, using lumber box drains, will probably average $18 per acre in lands that have been long seeped. The seepage is in general due to losses from the irrigation canals and can be prevented by lining or silting them where they cut through shale formations.

Construction of a silo, H. ATWOOD (*West Virginia Sta. Bul. 129, pp. 187–195, pls. 2*).—A discussion of some principles involved in silo construction. Directions are given for building a brick silo, reinforced with woven wire fencing, which is in use at the station. The estimated cost of this silo, including labor, was $313.

Cooperative silo building, C. NELSON (*Country Gent., 76 (1911), No. 3027, p. 110*).—Estimates are given of the cost of building stave and cement block silos.

The family house, C. F. OSBORNE (*Philadelphia, 1910, pp. 236, pls. 4, dgms. 23*).—This popular treatise on house building discusses location, sunshine and view, planning and building, heating and ventilation, plumbing, the house and the garden, timely repairs, and similar topics.

Domestic sanitary engineering and plumbing, F. W. RAYNES (*London, New York, Bombay, and Calcutta, 1909, pp. XIII+474, figs. 277*).—This book is designed for students of domestic sanitary engineering and plumbing, but especially for those who are to be entrusted with the design, supervision, and execution of this branch of engineering work.

Different chapters treat of subjects as follows: Materials and their properties and mode of manufacture; roof work; pipe fixing and pipe bending; pipe joints; solders, fluxes, and lead burning; sanitary fittings and accessories; soil and waste pipes; drainage of houses and other buildings; disposal and treatment of sewage from mansions and houses in country districts; water supply; appliances for raising water; hydrostatics and hydraulics; domestic hot water supply; and low pressure hot-water heating apparatus.

An appendix gives hydraulic memoranda, the weight of water at different temperatures, as well as of metals and cast-iron pipes, and dimensions of wire and plate gages.

Rural hygiene, H. N. OGDEN (*New York, 1911, pp. XVII+434, figs. 77*).—This book, which is one of the Rural Science Series edited by L. H. Bailey, was prepared by the professor of sanitary engineering in Cornell University, and presents the subject of hygiene in its broad relations to the general health of the community at large, dealing rather with the engineering than with the medical side, and in the case of diseases with prevention rather than with etiology and treatment. Details of engineering methods and processes are not attempted, but the way to a proper selection is indicated. The book emphasizes the interdependence in matters of hygiene of individulas and of communities, especially between rural and urban communities, and seeks "to promote the comfort and convenience of those living in the rural part of the community who, unfortunately, while most happily situated from the standpoint of health in many ways, have failed to give themselves those comforts that might so easily be added to their life."

The author holds that it is "not fair to say, despite frequent but careless statements by writers on typhoid fever, that this disease is a country disease, and that it is transmitted to the city by the vacationist who finds the disease lurking in the waters of the farm well. . . . As a matter of fact, the greatest danger from typhoid fever is neither in the country nor the large city, but in the village or small city. Here the growth and congestion of population has made necessary the introduction of a water supply, and in many cases this has not been supplemented by the construction of a sewerage system. The ground becomes saturated with filth, percolating, in many cases, into wells not yet abandoned, and the introduction of the typhoid germ brought in from outside is all that is needed to start a widespread epidemic."

But while the health conditions in the open country "are quite as good as those of the city, the comforts of country life are as yet inferior."

The introductory discussion of vital statistics or general health conditions in the open country is followed by chapters on location of a house—soil and surroundings, construction of houses and barns with reference to healthfulness, ventilation, quantity of water required for domestic use, sources of water supply, quality of water, water works construction, plumbing, sewage disposal, preparation and care of milk and meat, foods and beverages, personal hygiene, theories of disease, disinfection, tuberculosis and pneumonia, typhoid fever, children's diseases, parasitical diseases, diseases controlled by antitoxins, and hygiene and law

Sanitation in rural communities, C. E. NORTH (*Ann. Amer. Acad. Polit. and Soc. Sci., 37 (1911), No. 2, pp. 127–149*).—This article calls attention to the absence of official supervision of rural sanitation, compares the rural and urban death rates, and discusses household sanitation, ventilation, lighting and water supply, food, sewage and garbage disposal, transmission of disease by flies and mosquitoes and by diseased persons, and the need of education regarding sanitation in rural communities.

It is shown that the death rate in the northeastern United States is less in the country than in the city. The typhoid death rate is about the same in cities and in rural communities, while malaria is the more prevalent in the country. The need of giving greater attention to the rural water supply is especially emphasized, and the danger of using unprotected shallow wells is pointed out. It is shown that the water from such wells may be a fruitful source of minor intestinal diseases of various kinds, even if not the cause of spread of typhoid fever. In conclusion, the author states that "it is to be hoped that public sentiment on matters of sanitation and of general health will in the course of time reach the same degree of interest that is displayed in the study of agriculture. It does not seem unfair to suggest to the public authorities that at least as much money should be spent in instructing the dwellers in rural communties how to raise their own children and to protect themselves against infectious disease as is now expended in informing them how to raise pigs and how to breed cattle and horses."

Hot water for domestic use, edited by J. K. ALLEN (*Chicago, 1910, pp. 122, figs. 24*).—In this volume, designed to give information regarding supplying and heating water for domestic purposes, different systems of water heating are described and information is given on such topics as range boiler connections, use of check and safety valves, incrustation of water backs, and deposits of mud in water backs and boilers.

Electric lighting in the country (*Breeder's Gaz., 59 (1911), No. 2, p. 82*).—It is recommended that dynamos and storage batteries be used for electric lighting purposes in connection with the gasoline engines which many farmers now use for running farm machinery.

"Electric-light plants have been so simplified that nearly any farmer of intelligence can install and operate a plant himself, and many ingenious farmers can wire their houses and barns. A complete plant requires only a small space and can be set up either in a cellar or in some small outbuilding. The operating cost of an electric lighting plant is practically covered by the cost of the fuel required to run the engine, and a gasoline engine requires about 1 pint of gasoline per horsepower per hour. A 1-horsepower gasoline engine will cost about 2¼ cts. per hour for gasoline, assuming the price to be 18 cts. per gallon. This means that electric light can be supplied to the extent, for illustration, of 15 lights for about 4 to 8 cts. per hour, depending upon the amount of light used. The cost of such plants runs from about $400 upward."

Acetylene for lighting country homes, J. D. BOWLES (*Univ. Mo. Engin. Expt. Sta. Bul. 1, pp. 34, figs. 8*).—This bulletin, the first of a series to be devoted to private lighting systems, contains a brief discussion of the properties of acetylene, its preparation from calcium carbid, and its use as an illuminant.

The details of acetylene generation and of acetylene generators are considered, as well as the planning of a typical lighting arrangement, in which are taken up in detail the factors governing the size and number of burners, the capacity of generator required, piping and fixtures, and the value of scientific shading and diffusing of the light where satisfactory illumination is desired. Cooking and heating by acetylene are discussed briefly. The design of a complete installation is worked out in detail, with cost data, and village and town lighting systems are briefly discussed. An appendix contains the results of tests made by the station, a schedule of pipe sizes, and a table of dimensions and costs of acetylene generators, together with the list of generators approved by the National Board of Fire Underwriters.

The estimates for a country home which are presented are $283.40 for installation of the plant with a total yearly cost of $66.81 for maintenance. Estimates of about $225 for a cheaper installation, and $47.75 per year for its maintainance, are also given.

Acetylene gas as fuel for a domestic science kitchen, JOAN HAMILTON (*Jour. Home Econ., 2 (1910), No. 6, pp. 654, 655*).—A brief account is given of the installation and use of acetylene gas as a part of the equipment for domestic science work in schools. According to the author acetylene gas has proved satisfactory.

RURAL ECONOMICS.

Agricultural survey of four townships in southern New Hampshire, E. H. THOMSON (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 75, pp. 19, figs. 3*).—This circular gives the results of an agricultural survey of 4 townships in southern New Hampshire made for the purpose of determining the relative condition of farms in the region, the prevailing types of farming, and the profitableness of these types for that section. The information was obtained by a personal visit to each farmer within a certain area. Tables are given to show the average areas, capital, receipts, expenses, and profits for 266 farms; the distribution of the investment of capital, the distribution of profits in relation to the capital invested, and the average distribution of expenses. The data are summarized below:

Average area, capital, receipts, expenses, and profits for 266 New Hampshire farms, classified by types of farming.

Items covered by survey.	Dairy (118 farms).	Poultry (40 farms).	Fruit (9 farms).	General (99 farms).	Average (266 farms).
Area ....acres..	133.7	65.4	45.7	100.1	108.0
Tillable area ....acres..	37.6	18.2	21.1	31.6	31.9
Capital invested	$6,134	$4,066	$4,730	$4,972	$5,350
Receipts	1,633	1,754	2,300	1,386	1,582
Expenses, including unpaid family labor	1,071	1,072	908	838	978
Interest at 5 per cent	306	203	236	248	267
Labor income	256	479	1,156	300	337
Profit on investment ....per cent..	4.27	9.39	23.08	5.0	5.7

It is noted that "the average farmer in these 4 towns receives $1.07 per day, his house rent, and what the farm produces toward his own living," and "has practically three-fourths of his capital in real estate, including permanent improvements, and one-fourth in equipment," while nearly one-third of the farmers in the territory investigated "receive an income insufficient to pay 5 per cent on the capital invested, to say nothing for additional pay for their own time and labor."

The farmer as a business manager, D. H. OTIS (*Farmers Voice, 49 (1911), No. 115, pp. 8, 13, 15, 29*).—This is an address before a convention of farmers which reports and discusses the results of a special investigation of 20 dairy farms in Wisconsin comparing investment, expenses, receipts and net profits, taking (a) 10 farmers at random, largely in one county, but regardless of any reputation they have made in their business, and (b) 10 of the best farmers that could be found in the State.

The 10 farms taken at random showed the following averages: Size, 174 acres; land value, $12,885; improvements, $4,041; equipment, $859; live stock, $2,205; cash reserve, $80; total capital, $20,070; total receipts, $2,981; total expenses, $2,448; net profits, $533. The 10 farms chosen for their successful management averaged as follows: Size, 157¼ acres; land value, $13,396; improvements, $6,986; equipment, $1,162; live stock, $9,493; cash reserve, $595; total capital, $31,632; total receipts, $8,217; total expenses, $5,380; net profits, $2,835.

Farm accounting and the cost of producing crops, F. W. Gist (*Bien. Rpt. Okla. Bd. Agr., 2 (1909–10), pp. 189–195*).—This article points out the necessity and advantage of business methods in conducting a farm, inasmuch as farming is as much a business as the selling of goods or other occupation which involves the receipt and expenditure of money. Accurate records are considered feasible, and the article discusses a few simple and convenient forms by which the farmer may know at any time what are his liabilities and assets.

How a city family managed a farm, J. H. Arnold (*U. S. Dept. Agr., Farmers' Bul. 432, pp. 28, figs. 7*).—This points out how a family without previous experience or special training, by following systematically the ordinary cropping system and methods of tillage, succeeded in solving the problem of making a living, building a home, and educating the children. Among the more important social, economic, and technical farm problems worked out were those dealing with farm labor, the household, the training of children in responsibility in management, and the carrying on of farm work in a way to meet the requirements of a normal social life and of cultivated intellectual tastes.

A diary and a financial record were kept on this farm for 17 years and the data given are based on these records.

Two institute workers and their farm homes, D. H. Knowlton (*Agr. of Maine, 1909, pp. 66–73*).—An account of the practical working of two successful farms, showing the kind of crops grown, the acreage, and the yield of each, and demonstrating the practicability of raising live stock in connection with the farm.

Profitable farming in southern Wisconsin, R. E. Roberts (*Ann. Rpt. Wis. Bd. Agr., 1910, pp. 344–356*).—The author discusses the problem of building up and maintaining soil fertility the necessity of conserving farm manures, and the mistake of selling hay and roughage with the idea that it pays better than feeding it out upon the farm. He argues that under conditions where labor is scarce intensive farming should be practiced rather than extensive. The importance of system in every department of farm work is emphasized, showing that the successful farmer of the future must necessarily farm more intelligently. He suggests that a permanent and profitable system of farming may be best developed by keeping enough live stock of a high grade to profitably consume the farm products, yielding a good profit in itself, and at the same time furnishing a by-product to build up and maintain the fertility of the land.

Agriculture (*Ann. Rpt. Comr. Agr., Com. and Indus. S. C., 7 (1910), pp. 25–57*).—The report gives a detailed account of the development of the agricultural industry in South Carolina for the last decade, referring particularly to 9 of the leading crops of the State, giving comparative tables showing acreage, production, yield per acre, and value of product; and the acreage, production, value, cost of producing, and net profit of the trucking industry in the Charleston district from July, 1909, to July, 1910.

The average yield in corn for the entire State was increased from 8.9 bu. per acre in 1906 to 18.5 bu. per acre in 1910. The wheat crop in 1907 amounted to a little more than 2,500,000 bu. and in 1910 to 4,983,000 bu. The oat production per acre increased from 10.54 bu. in 1906 to 21 bu. in 1910.

The total value of agricultural products in 1900 is shown to be $51,324,000, whereas in 1910, omitting the fruit, trucking and live-stock industries, melon growing, and all minor divisions, the value had increased to $144,169,200.

The significance of agricultural soil in Germany and the yield from 1885 to 1910, H. Dade (*Mitt. Deut. Landw. Gesell., 25 (1910), No. 50, pp. 722–724*).—The author points out the significance of agricultural advancement in Germany and the income obtained from 1885 to 1910. Tables are given showing the proportion of landowners, renters, overseers, laborers, etc., in relation to the agricultural population, the relative size of the farms, and the number of the agricultural population for each size.

Division of estates and the migration from the land, E. Langenbeck (*Mitt. Deut. Landw. Gesell., 26 (1911), No. 10, pp. 116–121*).—This article discusses at length the tendency toward the division of estates in certain sections of Germany and the migration of the agricultural classes to the large industrial centers.

The agricultural association and its value to the Philippine farmer, E. A. Coddington (*Philippine Agr. Rev. [English Ed.], 3 (1910), No. 12, pp. 715–725*).—The author points out the social, educational, and economic advantages of agricultural organizations of farmers in the several spheres of farm life in the Philippine Islands, showing what has been done by such organizations in other countries and at the same time the lack of success thus far in the Philippines, which he attributes to the lack of commercial confidence on the part of the people not only in strangers but also in their own countrymen and neighbors.

[Agricultural organizations and the cooperative movement] (*Internat. Inst. Agr. [Rome], Bul. Bur. Econ. and Soc. Intel., 1 (1910), No. 2, pp. XV+283*).—This is a continuation of the series previously noted (E. S. R., 24, p. 591). The data here given deal with conditions in Germany, Austria, the Ottoman Empire, Great Britain, Ireland, Italy, Portugal, Norway, Sweden, Roumania, Holland, and Switzerland.

[Agricultural organizations and the cooperative movement] (*Internat. Inst. Agr. [Rome], Bul. Bur. Econ. and Soc. Intel., 1 (1910), No. 3, pp. XV+400*).—This is also a continuation of the series noted above, dealing with conditions in Germany, Austria, Belgium, Cuba, British India, France, Italy, and Great Britain.

The report also discusses more fully the recent law in France for individual credit for long periods on behalf of small rural properties. It is contended that this law establishes very important principles upon the subject and will tend to improve the social and economical condition of the peasant class and encourage them to remain on the farm.

Agricultural societies, J. Long (*Dairy, 23 (1911), No. 265, p. 7*).—A list is given of the various societies which are connected with agriculture and allied industries in Great Britain, as prepared by the Board of Agriculture. It is summarized as including 871 agricultural chambers and clubs, 240 live stock and show societies, and 231 agricultural cooperative societies. "There are now 32 agricultural credit societies in England and Wales, all of which are able to borrow from nonmembers under the Act of 1898. There are also 155 societies whose object is to provide small holdings and allotments to their members. Again, there are 100 agricultural cooperative societies which purchase manures, feeding stuffs, seeds, and other materials, and sell to their members. Among them are dairy, poultry, and egg societies. Cattle insurance societies number 61, of which 21 are in Lincolnshire. Horses are the object of insurance in only 2 societies, pigs in 32, and cattle in 23. There are, in addition, 20 societies of a more general character, 11 central cooperative societies, 12 horse-breeding, 22 cattle-breeding, 26 sheep-breeding, and 6 pig-breeding societies, and, in addition, 82 poultry and 12 dairy societies."

Historical résumé of works on agricultural statistics in Spain, J. DE ARCE (*Bol. Agr. Téc. y Econ., 3 (1911), No. 25, pp. 73–86*).—This report gives a history of agricultural statistics in Spain from 1748 to the present time.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 13 (1911), No. 2, pp. 9–16*).—This gives statistics of the average value per head of farm animals in the United States, the farm value of important crops, condition of the wheat crop in the United States and foreign countries 1907–1910, the monthly receipts of eggs and poultry in the chief markets of the United States, a summarized statement of the monthly interior movement of farm products, imports and exports of animals and animal products during 1909 and 1910, and the average farm price of horses and cattle in the United States, 1867–1911.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 13 (1911), No. 3, pp. 17–24*).—Statistics and notes on the condition and acreage of crops in the United States and foreign countries, the farm values and range of prices of agricultural products, the monthly receipts of eggs and poultry in the United States, the average wages of farm labor (male) during the past year, and the tonnage of farm products carried on railways in the United States, 1905–1909 are presented.

AGRICULTURAL EDUCATION.

Agricultural education: National Education Association—State and other teachers' associations, B. M. DAVIS (*El. School Teacher, 10 (1910), No. 9, pp. 444–452*).—The author deals in a historical way with the development of interest in agricultural education in the National Education Association, showing that it was not considered as a separate subject, except in connection with the agricultural colleges, until 1893, when the association held its meeting in connection with the International Congress of Education and a paper on agricultural education was read by a Russian delegate. Subsequently it appears that interest in this subject has increased rapidly.

In referring to the work of the state and interstate teachers' associations, the author finds that agricultural education began to receive attention from these associations at about the same time that the National Education Association became actively interested in it.

Shall theoretical and practical agriculture and the physical development of childhood be added to the curriculum of the city public schools? A. B. STICKNEY (*St. Paul, Minn., 1910, pp. 16, pls. 7, dgms. 2*).—The author reviews changes in the industrial conditions which have greatly reduced opportunities for the industrial employment of children, and recommends not only industrial courses but also agricultural courses for city children. He believes that these would contribute to the physical development of children. As chairman of a citizens' committee to plan a comprehensive system of parks for the city of St. Paul, he has drawn plans for a "composite agricultural school and physical development park," and these plans are illustrated and briefly described.

Agriculture and nature study for rural schools, H. W. HOCHBAUM (*State Norm. School. Colo. Bul., 10. ser., No. 5, pp. 44, figs. 24*).—This bulletin is devoted to rural school improvement and discusses why rural schools are often inefficient, the need of redirecting the work of the rural school, the aims in teaching nature study and agriculture, and the training of rural school-teachers. Outlines are given for teacher-training work in nature study, elementary agriculture, school gardening, outdoor art, plant production, soils and crops of the farm, animals of the farm, dairy industry and poultry husbandry, horticulture on the farm, the farm home, rural sociology, and the rural school, as well as outlines in nature study and agriculture for both the lower and upper grades arranged according to seasons.

Practical methods of approach suggested for teaching agriculture in schools, E. HYATT (*Indus. and Agr. Ed.* [*Cal.*], *Bul. 2, pp. 8, figs. 4*).—Specific suggestions are given for connecting the school work with (1) harvesting fruit crops, (2) school gardens, and (3) boys' and girls' agricultural clubs.

The soil, R. H. EMBERSON (*Univ. Mo. Bul., 10 (1909), No. 10, pp. 8, fig. 1*).—Six elementary lessons on soils, with a few simple practicums, are given. The lessons relate to the formation and kinds of soils, soil texture, soil tilth, and moisture in soils.

Ten lessons on the study of Indian corn, M. F. MILLER and R. H. EMBERSON, (*Univ. Mo. Bul.* [*1909*], *pp. 20, figs. 8*).—In these lessons, prepared for use in public schools, the authors treat of the history and uses of Indian corn and give suggestions for the study, judging, and testing of corn, and reasons for cultivating it.

Corn: The American cereal, D. W. WORKING (*W. Va. School Agr., 1 (1911), No. 3, pp. 42–62, figs. 10*).—This deals with the history and importance of corn, types of corn, the seed of the corn plant, plans for a corn show, and suggestions for boys' and girls' clubs, including a constitution and a helpful bibliography.

Directions for selecting corn for exhibition, W. D. HURD (*Facts for Farmers* [*Mass. Agr. Col.*], *1 (1910), No. 1, pp. 4*).—Suggestions are given for improving the quality of corn by field selection, selecting exhibits and preparing them for the corn show, and judging corn by means of the score card.

A study of cattle, R. H. EMBERSON (*Univ. Mo. Bul., 12 (1911), No. 4, pp. 16, figs. 8*).—Information is given concerning the origin of domestic cattle, the principal beef and dairy types and their conformation, and the importance of live stock on the farm.

The horse, R. H. EMBERSON (*Univ. Mo. Bul., 10 (1910), No. 11, pp. 8, figs. 4*).—Data concerning the origin of horses and the principal breeds in the heavy and light classes are given, with brief mention of ponies, donkeys, and mules.

Sewing, BESSIE W. BIRDSALL and LORA B. ABLE (*Winthrop Norm. and Indus. Col. S. C. Bul., 2 (1908), No. 2, pp. 31, pls. 9*).—Directions and illustrations are given for elementary stitches, seams, hems, gathering, bands and fastenings, plackets, darning and patching, ornamental stitches, embroidery and lace, and applied work.

The school museum in its relation to geography and commerce, C. R. TOOTHAKER (*Philadelphia: Phila. Museums, pp. 27, figs. 6, map 1*).—In this pamphlet suggestions for teachers are given on the use of specimens and illustrative material, largely agricultural, in teaching geography and mathematics.

Industrial contest for Minnesota boys and girls, 1910, G. F. HOWARD (*Univ. Minn., Dept. Agr., Ext. Bul. 3, 1910, pp. 24, figs. 5*).—Suggestions are made for organizing such contests, and the plans of the Minnesota School of Agriculture for promoting this work, beginning in April, 1911, are given.

Proceedings of the third annual Conference on Agricultural Education.—School and home gardens (*Mass. Agr. Col., Dept. Agr. Ed. Circ. 10, 1910, pp. 30, figs. 4, dgms. 2*).—The papers on school and home gardens presented at this conference are included in this pamphlet. They include the following: Coordinations Between Garden Work and Nature Work and Book Work, by G. L. Green; How Agriculture Put New Life into a Rural School, Ethel H. Nash; The Story of Pinehurst Gardener's Club, Aaron Green; Rural School and Home Gardens During the Summer, Elizabeth Hill; Gardening in the Schools of

Springfield, Fannie A. Stebbins; Home Gardens of the Worcester Public Schools, Edna R. Thayer; and Some Suggestions for Beginning Garden Work, W. R. Hart.

A list of books on school and home gardens and of other publications by the department of agricultural education of the Massachusetts Agricultural College is appended.

Agricultural fair associations and their utilization in agricultural education and improvement, J. Hamilton (*U. S. Dept. Agr., Office Expt. Stas. Circ. 109, pp. 23*).—This circular gives the result of an extended study of the conditions of county fairs in the various States, and contains numerous suggestions in detail as to methods of increasing their usefulness for the betterment of educational, social, and economic conditions in rural communities. These suggestions relate to the management of the fair, exhibits, judging, the allotment of space, demonstrations, contests, entertainments and amusements, concessions, and other important details. An appendix contains a suggested form of organization.

Farmers' clubs (*Univ. Minn., Dept. Agr., Ext. Bul. 1, 1910, pp. 16*).—The possible functions of such clubs and their value in cooperative educational endeavor are discussed, and a suggestive constitution and by-laws are given.

List of books for a farmer's library (*Penn. State Col., Dept. Agr. Ext. Circ. 10, pp. 4*).—Lists of books with publishers and prices are given on general agriculture, agricultural economics, farm equipment, live stock, crops, soils, dairying, general horticulture, and special topics. These lists would be useful to teachers of agriculture in high schools.

MISCELLANEOUS.

Twenty-first Annual Report of Arizona Station, 1910 (*Arizona Sta. Rpt. 1910, pp. 361–402, table 1, figs. 3*).—This contains the organization list, an administrative report by the director on the work and publications of the station, a financial statement for the fiscal year ended June 30, 1910, and departmental reports, the experimental features of which are for the most part abstracted elsewhere in this issue, together with determinations of the solubility of copper sulphid in pure water, analyses of Salton Sea water, and discharge measurements of the Rillito and Santa Cruz rivers.

Twenty-second Annual Report of Illinois Station, 1909 (*Illinois Sta. Rpt. 1909, pp. 11*).—This contains lists of the publications of the station since its establishment and during the fiscal year, a brief statement concerning the principal lines of work, and a financial statement for the fiscal year ended June 30, 1909.

Twenty-third Annual Report of Illinois Station, 1910 (*Illinois Sta. Rpt. 1910, pp. 12*).—Data similar to the above are reported for the fiscal year ended June 30, 1910.

Twenty-third Annual Report of New York Cornell Station, 1910 (*New York Cornell Sta. Rpt. 1910, pp. LIV+498, pl. 1, figs. 222*).—This report, which is not intended for general distribution, contains the organization list of the station, a report of the president of the university, a report of the acting director which includes brief statements of the main lines of work of the various departments, a financial statement as to the federal funds for the fiscal year ended June 30, 1910, and reprints of Bulletins 270–277 and 279–283.

Twenty-eighth Annual Report of New York State Station, 1909 (*New York State Sta. Rpt. 1910, pp. 588, pls. 31, figs. 10*).—This contains the organization list of the station, a financial statement for the federal funds for the fiscal year ended June 30, 1909, and for the state funds for the fiscal year ended September 30, 1909, reprints of Bulletins 311–315, 317, and 319–321, Technical Bulletins 9–12, and Circulars 10–12, all of which have been previously noted, a list of the periodicals received by the station, and meteorological observations noted on page of this issue.

Director's report for 1910, W. H. JORDAN (*New York State Sta. Bul. 332, pp. 583–608*).—This contains the organization list and a review of the work and publications of the station for the year, with a discussion of its needs and functions.

Third Annual Report of Dickinson Subexperiment Station, 1910, L. R. WALDRON (*North Dakota Sta., Rpt. Dickinson Substa. 1910, pp. 85, figs. 14, charts 10*).—This contains the organization list of the North Dakota Station and an account of the Dickinson substation for 1910. The experimental work recorded is abstracted elsewhere in this issue.

Twenty-ninth Annual Report of Ohio Station, 1910 (*Ohio Sta. Bul. 220, pp. XXVII*).—This contains an announcement concerning the work of the station, the organization list, a report of the board of control containing the text of the act of 1910 providing for the establishment of county experimental farms, a financial statement for the fiscal year ended June 30, 1910, and a report of the director summarizing the work of the station during the year.

Twenty-third Annual Report of South Carolina Station, 1910 (*South Carolina Sta. Rpt. 1910, pp. 73, figs. 3*).—This contains the organization list of the station, a financial statement for the fiscal year ended June 30, 1910, and reports of the director and heads of departments on the work of the station during the year, the experimental features of which are abstracted elsewhere in this issue. Analyses of mucks, ground limestone, oyster-shell lime, soot, and of several soils are also reported.

Report of the director on the establishment of the new state stations, H. H. HARRINGTON (*Texas Sta. Bul. 134, pp. 11*).—An account of the establishment of substations in Texas at Denton, Fort Worth, Spur, Lubbock, Pecos, and Beaumont, and of the expenditures under the state appropriation for the purpose.

Press bulletins (*Ohio Sta. Bul. 220, pp. 660–666*).—Reprints of press bulletins on the following subjects: Harvest mites, "jiggers" or "chiggers"; the mineral elements in animal nutrition; forage crops for emergencies; the need of lime on southwestern Ohio soils; purchasing seeds and fruit trees; profits in farm poultry; growing the best varieties of corn; examining seed potatoes for dry rot; Ohio pastures; the blade blight or yellowing of oats; and how to fight the chinch bug.

Publications of the Office of Experiment Stations (*U. S. Dept. Agr., Div. Pubs. Circ. 17, pp. 12*).—The publications of this Office available for distribution by the Division of Publications are here listed.

Publications of the Library (*U. S. Dept. Agr., Div. Pubs. Circ. 18, pp. 3*).—The publications of the Library available for distribution by the Division of Publications are here listed.

NOTES.

Hawaii Federal Station.—The recent Territorial legislature appropriated $20,000 for the station for the next biennial period, to be used chiefly in maintaining demonstration farms on the various islands. Three of these farms are already in operation, one on Kauai and two on Hawaii. Two more will be established on Maui, one in the rubber district and one in the corn district, with possibly an additional substation in the Kona district of Hawaii. These demonstration farms will enable the station to carry on experiments with nearly all of the important crops in localities which are especially suited to them. Attention will be given chiefly to cotton, corn, taro, bananas, pineapples, rubber, coffee, legumes, and a few garden vegetables, and to the soil conditions and insect pests affecting these crops.

It is expected that sufficient funds will be available to build a propagating house and horticultural laboratory during the coming year.

Kansas College and Station.—Recent appointments include M. M. Sherman, of Crawford, to the board of regents, A. H. Leidigh in charge of the crops work of the department of agronomy, and C. E. Millar as assistant in soil analysis.

Minnesota Station.—H. B. Scammell has been appointed assistant entomologist, and has entered upon his duties.

Missouri University and Station.—The three special trains sent out this spring covered 2,640 miles, with 512 addresses to 93,800 people. The train over the Wabash Railroad was visited by 35,000 people in three days. A special teacher was employed to address school children above the fifth grade, and it is estimated that over 10,000 were reached in this way.

R. C. Bishop has been appointed assistant in chemistry.

Nebraska University and Station.—A. E. Davisson, principal of the school of agriculture since its establishment, died April 13. O. L. Sponsler has been added to the station staff, vice F. J. Phillips, deceased.

New Mexico College and Station.—A department of extension work has been established, in charge of H. H. Schutz, now assistant agronomist.

Dr. J. H. Squires, of the department of agronomy, has resigned to engage in commercial work, to take effect July 1. E. C. Wooton, of the departments of botany, biology, and geology, has also resigned, to take effect on the same date, and will be succeeded by H. S. Hammond, at present assistant professor of biology. J. W. Rigney, a student assistant in the department of horticulture, has been appointed assistant in that department for special work on the codling moth and Irish potatoes. A series of experiments is to be undertaken to determine the effect of electric lights on the codling moth.

Cornell University and Station.—G. A. Crabb, of the department of soil technology, has accepted a position with the Bureau of Soils of this Department.

Rhode Island College and Station.—A State appropriation of $1,000 has been granted for additional work in the college extension department. E. F. Southwick has resigned as assistant in agronomy in the station.

West Virginia Station.—F. E. Brooks, associate entomologist, has accepted a position with the Bureau of Entomology of this Department.

INDEX OF NAMES.

INDEX OF SUBJECTS.

NOTE.—The abbreviations "Ala. College," "Conn. State," "Mass.," etc., after entries refer to the publications of the respective experiment stations; "Alaska," "Hawaii," and "P. R." to those of the experiment stations in Alaska, Hawaii, and Porto Rico; "Can." to those of the experiment stations in Canada, and "U.S.D.A." to those of this Department.

1368 Issued June 29, 1911.

U. S. DEPARTMENT OF AGRICULTURE

OFFICE OF EXPERIMENT STATIONS

A. C. TRUE, DIRECTOR

Vol. XXIV ABSTRACT NUMBER No. 8

EXPERIMENT STATION RECORD

WASHINGTON
GOVERNMENT PRINTING OFFICE
1911

U. S. DEPARTMENT OF AGRICULTURE.

Scientific Bureaus.

WEATHER BUREAU—Willis L. Moore, *Chief.*
BUREAU OF ANIMAL INDUSTRY—A. D. Melvin, *Chief.*
BUREAU OF PLANT INDUSTRY—B. T. Galloway, *Chief.*
FOREST SERVICE—H. S. Graves, *Forester.*
BUREAU OF SOILS—Milton Whitney, *Chief.*
BUREAU OF CHEMISTRY—H. W. Wiley, *Chemist.*
BUREAU OF STATISTICS—V. H. Olmsted, *Statistician.*
BUREAU OF ENTOMOLOGY—L. O. Howard, *Entomologist.*
BUREAU OF BIOLOGICAL SURVEY—H. W. Henshaw, *Chief.*
OFFICE OF PUBLIC ROADS—L. W. Page, *Director.*

OFFICE OF EXPERIMENT STATIONS—A. C. True, *Director.*

THE AGRICULTURAL EXPERIMENT STATIONS.

ALABAMA—
- College Station: *Auburn;* J. F. Duggar.[a]
- Canebrake Station: *Uniontown;* F. D. Stevens.[a]
- Tuskegee Station: *Tuskegee Institute;* G. W. Carver.[a]

ALASKA—*Sitka:* C. C. Georgeson.[b]
ARIZONA—*Tucson:* R. H. Forbes.[a]
ARKANSAS—*Fayetteville:* C. F. Adams.[a]
CALIFORNIA—*Berkeley:* E. J. Wickson.[a]
COLORADO—*Fort Collins:* C. P. Gillette.[a]
CONNECTICUT—
- State Station: *New Haven;* E. H. Jenkins.[a]
- Storrs Station: *Storrs;* L. A. Clinton.[a]

DELAWARE—*Newark:* H. Hayward.[a]
FLORIDA—*Gainesville:* P. H. Rolfs.[a]
GEORGIA—*Experiment:* Martin V. Calvin.[a]
GUAM—*Island of Guam:* J. B. Thompson.[b]
HAWAII—
- Federal Station: *Honolulu;* E. V. Wilcox.[b]
- Sugar Planters' Station: *Honolulu;* C. F. Eckart.[a]

IDAHO—*Moscow:* W. L. Carlyle.[a]
ILLINOIS—*Urbana:* E. Davenport.[a]
INDIANA—*La Fayette:* A. Goss.[a]
IOWA—*Ames:* C. F. Curtiss.[a]
KANSAS—*Manhattan:* E. H. Webster.[a]
KENTUCKY—*Lexington:* M. A. Scovell.[a]
LOUISIANA—
- State Station: *Baton Rouge;*
- Sugar Station: *Audubon Park, New Orleans;*
- North La. Station: *Calhoun;*

W. R. Dodson.[a]

MAINE—*Orono:* C. D. Woods.[a]
MARYLAND—*College Park:* H. J. Patterson.[a]
MASSACHUSETTS—*Amherst:* W. P. Brooks.[a]
MICHIGAN—*East Lansing:* R. S. Shaw.[a]
MINNESOTA—*University Farm, St. Paul:* A. F. Woods.[a]
MISSISSIPPI—*Agricultural College:* J. W. Fox.[a]
MISSOURI—
- College Station: *Columbia;* F. B. Mumford.[a]
- Fruit Station: *Mountain Grove;* Paul Evans.[a]

MONTANA—*Bozeman:* F. B. Linfield.[a]
NEBRASKA—*Lincoln:* E. A. Burnett.[a]
NEVADA—*Reno:* J. E. Stubbs.[a]
NEW HAMPSHIRE—*Durham:* J. C. Kendall.[a]
NEW JERSEY—*New Brunswick:* J. G. Lipman.[c]
NEW MEXICO—*Agricultural College:* Luther Foster.[a]
NEW YORK—
- State Station: *Geneva;* W. H. Jordan.[a]
- Cornell Station: *Ithaca;* L. H. Bailey.[a]

NORTH CAROLINA—
- College Station: *West Raleigh;* C. B. Williams.[a]
- State Station: *Raleigh;* B. W. Kilgore.[a]

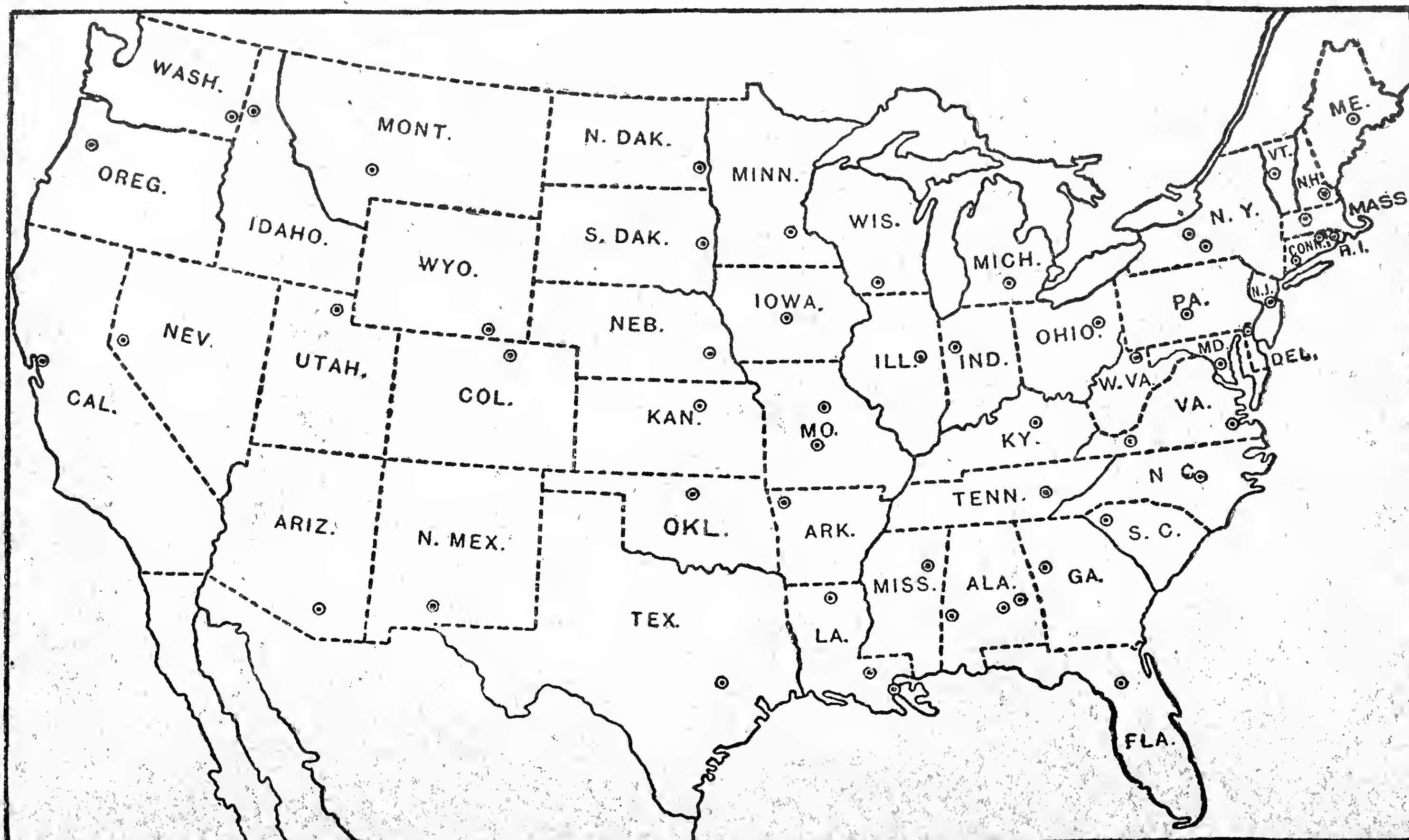
NORTH DAKOTA—*Agricultural College:* J. H. Worst.[a]
OHIO—*Wooster:* C. E. Thorne.[a]
OKLAHOMA—*Stillwater:* J. A. Wilson.[a]
OREGON—*Corvallis:* J. Withycombe.[a]
PENNSYLVANIA—
- *State College:* T. F. Hunt.[a]
- *State College:* Institute of Animal Nutrition, H. P. Armsby.[a]

PORTO RICO—
- Federal Station: *Mayaguez;* D. W. May.[b]
- Sugar Planters' Station: *Rio Piedras;* J. T. Crawley.[a]

RHODE ISLAND—*Kingston:* H. J. Wheeler.[a]
SOUTH CAROLINA—*Clemson College:* J. N. Harper.[a]
SOUTH DAKOTA—*Brookings:* J. W. Wilson.[a]
TENNESSEE—*Knoxville:* H. A. Morgan.[a]
TEXAS—*College Station:* H. H. Harrington.[a]
UTAH—*Logan:* E. D. Ball.[a]
VERMONT—*Burlington:* J. L. Hills.[a]
VIRGINIA—
- *Blacksburg:* S. W. Fletcher.[a]
- *Norfolk:* Truck Station, T. C. Johnson.[a]

WASHINGTON—*Pullman:* R. W. Thatcher.[a]
WEST VIRGINIA—*Morgantown:* J. H. Stewart.[a]
WISCONSIN—*Madison:* H. L. Russell.[a]
WYOMING—*Laramie:* H. G. Knight.[a]

[a] Director. [b] Special agent in charge. [c] Acting director.



THE AGRICULTURAL EXPERIMENT STATIONS OF THE UNITED STATES.