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Alabama Academy of Science

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Volume I

ABSTRACTS

1924-26

Office of the Secretary
Howard College
Birmingham, Alabama

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Alabama Academy of Science

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ABSTRACTS OF PAPERS PRESENTED AT THE MONTGOMERY MEETING APRIL 4th, 1924.

SOME EFFECTS PRODUCED IN MAN BY EATING VELVET BEANS. By Emerson R. Miller, Alabama Polytechnic Institute.

When coarsely ground velvet beans were boiled in an open vessel it was observed that soon after boiling began some substance was given off which produced a burning or smarting sensation in the eyes and also produced headache.

The beans were prepared for eating by grinding, boiling one and a half to two hours and seasoning with salt and butter. The effect produced by eating the beans is, naturally, somewhat variable, being much more pronounced with some individuals than with others. Of eight persons who took part in the experiment only one reported voluntary vomiting. In this case seventy grams had been eaten. In all cases the effects produced were disagreeable.

To some the taste was not at all unpleasant. On the other hand one individual soon complained of the unpalatability, saying he could scarcely force himself to eat more, due to nausea. In general, within an hour, there was a feeling of fullness and heaviness in the stomach, headache, nausea, irritation and restlessness. Two persons reported a sensation of heat attended with perspiration. In some cases the effect lasted eight or nine hours.

VELVET BEANS AS A RATION FOR BROOD SOWS. By Emerson R. Miller, Research Chemist in Agriculture, and W. D. Salmon, Assistant in Animal Industry Research; Alabama Experiment Station, Alabama Polytechnic Institute, Auburn.

Experiments with 15 brood sows carried through more than 30 litters show the following results: (1) When velvet beans alone were fed, the pigs farrowed were an absolute failure. The pigs were undersized and lacked vitality and many were dead at birth. The ones that were alive lived only a few days. The milk supply of the sows was very scant. (2) When calcium salts and sodium chloride were added to the velvet bean ration, there was little if any improve-

ment. (3) The further addition of cod liver oil did not produce any better results. (4) The addition of calcium carbonate, sodium chloride, cod liver oil, and yeast gave a marked improvement. The pigs were normal in weight at birth but the rate of growth was decidedly below normal. (5) When a ration of velvet beans 50 per cent and corn 50 per cent was fed, the pigs were fair in weight and vitality at birth. The rate of growth of the pigs, however, was far below normal. (6) The addition of mineral matter to the ration of velvet beans (50 per cent) and corn (50 per cent) still gave unsatisfactory results. (7) The use of 25 per cent of velvet beans and 75 per cent of corn, with the addition of mineral matter, resulted in failure. (8) The use of 50 per cent of velvet beans and 50 per cent of a normal ration did not give satisfactory results. (9) When 25 per cent of velvet beans and 75 per cent of a normal ration were fed the results were decidedly better but not entirely satisfactory. (10) When velvet beans were fed for the first 75 days of the gestation period and then replaced by a normal ration, the pigs farrowed were normal in weight. They grew at about the normal rate but the percentage of pigs that reached the weaning age was somewhat smaller than would be expected under normal conditions.

ABNORMAL DEVIATIONS OF THE SPINE. By Charles K. Zeilman, Director of Physical Education and Assistant Professor of Physics, Birmingham-Southern College, Birmingham.

Abnormal deviations of the spine which influence posture are usually classified as follows: (1) Kyphosis, or abnormal backward convexity in the thoracic region; (2) Lordosis, or abnormal forward convexity in the lumbar region; (3) Scoliosis, or lateral deviation; (4) Flat back, or obliteration of the normal lumbar curve.

Treatment of abnormal faulty positions of the spinal column can be accomplished in three ways, (1) posture, (2) gymnastics, and (3) mechanical appliances. The last should always be supplemented by gymnastics.

In conclusion, it should be noted that the four types of spinal abnormalities discussed are good examples of impaired body mechanics. Such deformities must be guarded against by striving so to cultivate the body that only the slightest effort will be needed to maintain balance and poise. Especially is this true with children. The body must be carried erect, for only then are the vital organs in a position to work

efficiently. Poor posture is, to a great extent, responsible for physical and mental fatigue. Thus, poor posture and poor health usually go hand in hand. Moreover, it is necessary that all spinal distortions be corrected early, if health is to be maintained.

LOW TEMPERATURE PRECIPITATION OF IRON.

C. A. Basore, Alabama Polytechnic Institute.

It is well known that as ordinarily carried out the separation of iron from nickel by means of ammonium hydroxide is not quantitative, the iron in all cases carrying down considerable quantities of salts of this metal by adsorption, even though the hydroxide of the nickel is not actually precipitated by the ammonium hydroxide under the conditions of the experiment. While extreme accuracy is not claimed for the method, it was found that where the iron content is comparatively low, 10-15%, the method is sufficiently accurate for many purposes when carried out as follows:

To a practically neutral solution of iron (ferric) and nickel salts (sulphates) add 25cc. of sulphuric acid (1:1). Nearly neutralize with ammonium hydroxide, i. e. add the base until another drop would cause a permanent precipitate. Dissolve any precipitate that may persist with a drop of dilute sulphuric. Dilute to 250cc. and cool the solution to 10-20 degrees C. Pour the solution slowly into 50cc. of concentrated ammonium hydroxide contained in a large beaker, constantly stirring the solution. After the ferric hydroxide settles, filter, wash five or six times with cold water, ignite and weigh in the usual way as ferric oxide. The nickel can be determined in the filtrate by acidifying with sulphuric, adding oxalic acid, heating to boiling, adding dimethylglyoxime and making just alkaline with ammonium hydroxide. Allow to stand until cool, before filtering, and continue in the usual way.

Some typical analyses secured by this method were given.

ELECTROLYTIC CALCIUM ARSENATE. Stewart

J. Lloyd, University of Alabama.

In making calcium arsenate from white arsenic, the expensive operation is or has been the oxidation by nitric acid of the trivalent arsenic to the pentavalent condition. Expensive towers to recover and regenerate the nitric acid make a high capital cost of plant inevitable. Mr. A. M. Kennedy and the author have substituted electrolytic oxidation of white arsenic, in caustic soda solution for this nitric acid procedure.

Sheet iron electrodes are used, in the form of trays, bipolar, one-half inch apart. A voltage of 3, and current density of 10 amperes per sq. foot are used. Current efficiency of 87%, and energy efficiency of about 70% result. Hydrogen and a small amount of metallic arsenic are produced as by-products.

The resulting sodium arsenate and caustic soda are precipitated with hydrated lime, and calcium arsenate produced, the resulting caustic soda solution being evaporated and used to dissolve a fresh batch of arsenic. The cost of producing calcium arsenate should be reduced by at least two cents a pound through the use of this method.

The Alabama Power Company, which defrayed through its research department the cost of the investigation has leased to the Gulf States Chemical Company its old steam plant in Montgomery, at a nominal rental, and a twenty-ton plant is now beginning operations.

Some arsenic ore occurs in East Alabama, and may serve later as a source of supply.

THE DISTRIBUTION OF AND THE DAMAGE DONE BY THE DRY-ROT FUNGUS, *PORIA INCRASSATA*, IN ALABAMA. By L. E. Miles, Extension Plant Pathologist, Alabama Polytechnic Institute, Auburn.

The greater part of the increasingly heavy losses from decay of timber stored in lumber-sheds or used in construction in Alabama and other southern states is due to the fungus, *Poria incrassata*. This organism is capable of attacking and destroying practically any of the common woods of the United States. In a brief ten-day survey of points in Alabama, 21 properties were found infected by this fungus. Several others have been reported since. Seven were in retail lumber-sheds, serving as a potential source of wide-spread dissemination. The others were in churches, warehouses, livery stables, residences, college buildings, etc. These 21 infected properties were distributed among the following towns and cities: Montgomery, Troy, Selma, Eclectic, Irvington, Auburn, Opelika, Orrville and Tuscaloosa. The greatest damage in the state has resulted from infected lumber used in construction. In one instance the owner estimated that repairs to a very fine residence, caused by this fungus within three years after completion, cost somewhere between \$12,000 and \$17,000.

Control measures should be directed toward preventing new infection. This should include eradication of infection in lumber yards, suitable change in building designs, and the

consumer should see that the basement and sub-floors are amply ventilated. The sub-floor timbers should be thoroughly treated with coal tar creosote. Where this is objectionable, a 6% water solution of zinc chloride or a 4% solution of sodium fluoride may be used.

When the fungus has gained entrance, the only feasible remedy is complete eradication of every trace of infection. Cut back the timbers from two to three feet beyond all trace of decay. Timbers adjacent to the infected ones should be removed, and nearby masonry and soil should all be treated by dipping or dusting with the antiseptics recommended above.

THE EYE IS THE WINDOW OF THE MIND. By E. E. Sechriest.

The world is growing more insistent that educational information be transmitted relatively more through the eye than by means of the ear. Man's eye has been enormously assisted by two great inventions, the camera and the microscope. The photographic record perpetuates the results of the explorer and follows the scientist into his laboratory. By far more sensations are obtained through the eye than by means of any other sense organ. Hence, the value of motion pictures! They are especially valuable for the purpose of teaching in all the realms of science, for example, geography, biology, physics, etc.; and large appropriations are being made by educational authorities to carry on this work.

It is notable, also, that the advent of the motion picture coincides with the need of speeding up our educational procedures, especially for the training of leaders. Pictures are very necessary for the purpose of illustrating thoughts expressed by words. And their value is stated very aptly by Tupper when he says, "The eye catcheth in an instant what the ear shall not learn in an hour."

THE CHEMICAL COMPOSITION OF ACORNS AND THEIR VALUE AS FEED STUFFS. By Emerson R. Miller and S. J. Marion, Auburn.

In several respects all kinds of acorns so far examined appear to be deficient as feed stuffs and some contain injurious substances. Owing to the tannin and quercitrin which they contain the bitter varieties are apt to interfere with the process of digestion and if fed in large quantity may even cause death.

Results obtained by feeding acorns to different kinds of animals have led to the conclusion that they should not be fed in large quantity to cows, that they are better suited for hog feed and that in small amounts they may be fed to sheep and goats with good results. When used as the sole ration for hogs softening of the bones resulted.

With reference to their use as a poultry feed reports are contradictory. One writer recommends acorns (kind not stated) as a substitute for corn if their deficiency in protein be supplied. On the other hand another experimenter reports that thirty grams of dried acorns daily per fowl, added to the ordinary feed mixture, caused a decrease in egg laying and finally complete cessation.

We have made several analyses of air dried acorns from *Quercus nigra*, all cups being removed. From the following data it will be seen that acorns of this species are low in protein and very deficient in mineral matter, particularly calcium and phosphorus. On the other hand they rank high in their content of carbohydrate and fixed oil (ether extract).

Moisture	20.84 %
Ether extract (Fat).....	24.3 %
Protein (N x 6.25).....	2.63 %
Carbohydrates	48.00 %
Crude fiber.....	2.50 %
Ash	1.02 %
Calcium	0.20 %
Phosphorus	0.064%

Properties of the oil.

20°	
d—	0.9165
20°	
Saponification number.....	193
Iodine number.....	87.8
Acid number.....	2.6

THE STATE MINE EXPERIMENT STATION AND ITS RELATION TO THE MINING AND METALLURGICAL INDUSTRIES. By H. P. Pallister, Director, School of Mines, College of Engineering, University of Alabama, Tuscaloosa.

Created by act of the state legislature of 1919, the School of Mines of the University of Alabama has two lines of endeavor: (1) the teaching of mining engineering and (2) research work, which latter is handled under the name of the State Mine Experiment Station. In research work on the

mineral resources of the state, the State Mine Experiment Station co-operates with the Southern Experiment Station of the U. S. Bureau of Mines.

In addition to its regular staff, the School of Mines provides for five graduate research fellowships at \$540.00 each for a nine months period. The men work on original lines of mining investigation. The mine experiment station at the University of Alabama ranks second among the iron ore beneficiation laboratories of the United States. Among the problems which have been investigated at the station during the past three years are, uses of Alabama graphites in the industries; suitability of Alabama clays for use as mineral fillers; improvement in the methods of coal washing; and the concentration of the low grade iron ores of Alabama.

The State Mine Experiment Station is ready and willing at all times to help in testing mineral deposits to determine their suitability for uses in the industries.

LEUKOCYtic INDICES OF BODY RESISTANCE,
WITH REPORT OF A NEW INDEX. By Walter Clinton
Jones, Professor of Zoology, Birmingham-Southern College,
Birmingham.

From a review of the literature on this subject and the observations of the writer, the following conclusions may be drawn:

1. The fact that the percentage of polymorphonuclears is a measure of the severity of an acute infection and that the total white count indicates the degree of resistance of the patient, constitute the two most fundamental principles underlying the application of leukocytic counts to clinical cases. These principles were established about twenty years ago by Sondern; and on the basis of these discoveries, Gibson, and Wilson worked out very useful clinical index charts.

2. The total number of leukocytes per cubic millimeter (not percentage) constitutes a valuable clinical index. Holmes has had a very large part in establishing this principle. This index is useful in both acute and chronic infections but particularly in the latter, especially tuberculosis.

3. A lymphocytic index of resistance has been worked out by the author, using the total white count and the percentage of lymphocytes. This index parallels Walker's very closely but averages about six points higher.

4. Polymorphonuclear indices are useful chiefly in acute infections. Lymphocytic indices are of value in both acute and chronic inflammations.

5. When the percentage of polymorphonuclears rises much above 90, the total white count should reach 50,000 or more in order to justify a favorable prognosis.

6. One should not fail to correlate carefully laboratory blood findings with the clinical symptoms.

AN INTERESTING VOLATILE OIL PLANT OF ALABAMA. By Emerson R. Miller, Auburn.

One of the most interesting of the native plants of Alabama is *Pycnanthemum Tullia* Benth.

With reference to the predominating odor four distinct types have been recognized: first, the cineol type; second, the geraniol type; third, the pulegone type; fourth, another type more difficult to characterize.

1. A large amount of material from the first type has been studied and the following constituents of the oil identified: 1—alpha pinene, cineol, geraniol, salicylic acid, acetic acid, and butyric acid. The acids are present mainly in the form of esters of geraniol. Quantitatively cineol is the chief constituent.

2. Only a small amount of material from plants of the second type was distilled. The yield of oil from these two types was about the same, namely 0.75% to 0.90%, based on the weight of fresh material consisting mainly of leafy tops collected when the plants were in bloom.

In physical and chemical properties the oils from these two types present marked differences as shown in the following table:

	$\frac{25^{\circ}}{d_{25^{\circ}}}$	Rotation in 100 mm. tube	Index of refraction at 24°	Saponification number	Sapon. number after acetylation	Percent acetate of C ₁₀ H ₁₇ OH	Combined Alcohol C ₁₀ H ₁₇ OH	Total Alcohol C ₁₀ H ₁₇ OH	Free Alcohol C ₁₀ H ₁₇ OH
Cineol type	0.9002	-21.85	1.4672	5.45	59.7	1.91	1.50	17.19	15.69
Geraniol type	0.8775	-6.55	1.4710	21.88	184.0	7.65	6.02	58.70	52.68

Geraniol and its acetic ester are the only compounds so far identified in the oil from the geraniol type. These together constitute nearly 60% of the oil. Cineol is either absent or present in very small amount.

THE MEXICAN COTTON BOLL WEEVIL AS A NATIONAL PROBLEM. W. E. Hinds, Entomologist, Auburn, Ala.

Before the advent of the Mexican cotton boll weevil cotton was considered the surest crop that could be grown in the South. Because of this certainty of production and also because the product was of no possible use to the tenants and could be kept indefinitely if properly stored, cotton alone became the basis of southern agriculture with its large plantation system with poverty stricken tenants who were obliged to mortgage the current crop to the land owner or local merchant or a banker for the food supplies which they required in producing the crop. Under this system the South was growing more cotton than the market demanded and only a small part of the food and feed which it required. Consequently the Cotton Belt was practically bankrupt and the majority of its population living under a condition of economic slavery. Only the consumer of cheap cotton products was benefited by this system. So long as there continued to be a surplus of cotton the damage caused by the boll weevil was borne almost entirely by the producer of cotton. There was no possibility of making the improvements so sorely needed in southern roads, schools, churches and homes.

The fight against the boll weevil led to the establishment of the Farm Demonstration Work in 1904 and this grew into the Extension Service with its County Farm and Home Demonstration Agents and its Boys' and Girls' Club Work. Through this service expert leaders have done an immeasurably valuable work in improving farming practices and home and community conditions.

The spread of the boll weevil throughout the Cotton Belt entirely changed both the agricultural and the economic situations. Cotton became uncertain, therefore the tenant was obliged to raise his own living aside from his cotton. This meant crop diversification and rotation with more livestock, legumes and soil improvement. Yields were reduced greatly, and the value of cotton lint advanced to two, three and four times its previous average level. The people of the Cotton Belt began to prosper with less cotton, more corn and livestock, etc. The South imported less foodstuffs but became a far more valuable customer for the manufactured products of the more industrial sections. The needed improvements began to be made in roads, schools and homes with beneficial results in health, education and happiness spread through some eleven states and affecting directly more than one-fourth of the entire population of the United States.

Now with the supply of cotton less than the demand, the burden of loss from boll weevil destruction of more than 2,000,000 bales a year has been transferred from the producer to the consumer of cotton and its many products. Thus Billy Boll Weevil's bill to the average family of the United States is not less than \$50.00 per annum in the increased cost of cotton clothing alone. People in all sections should know that the boll weevil affects every citizen and its control is a national problem of vast importance.

THE DECOMPOSITION OF ORGANIC TOXINS BY SOIL ORGANISMS. Wright A. Gardner, Auburn.

Since most of the other factors influencing the elimination of the evil effects of organic toxins on plant growth have received adequate consideration it seemed desirable to determine the conditions for the growth of toxin decomposing organisms, to ascertain which toxins may be decomposed, and to learn the distribution of the organisms.

Solution cultures of 46 soils were used in the investigation which is reported in detail in Alabama Experiment Station Bulletin No. 225.

The summary follows:

1. The addition of calcium sulphate improves Robbins' solution for the growth of soil organisms.
2. Solutions but slightly acid to phenolphthalein yield the most abundant growth of a majority of soil organisms.
3. Seven toxins have been added to the list of those decomposed by soil organisms, namely, resorcinol, cinnamic acid, quinone, hydroquinone, caffeine, piperidine, and benzidine.
4. Vanillin, cumarin and resorcinol decomposing organisms are very common and widely distributed.
5. Cinnamic acid, caffeine and quinone are decomposed by the organisms of about two-thirds of the widely distributed soils tested.
6. Hydroquinone is decomposed by about one-third of the widely distributed soils examined.
7. About three-fourths of the soils from the several states contain organisms able to decompose pyridine and piperidine.
8. A few soils contain benzidine decomposing organisms.
9. Vanillin, cumarin, cinnamic acid and resorcinol decomposing organisms occur in one or more soils from each of nine states.

10. In order of mention, quinone, hydroquinone, caffein, pyridine, piperidine and benzdine decomposing organisms occur in a decreasing number of states.
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HISTORICAL SKETCH OF THE ALABAMA INDUSTRIAL AND SCIENTIFIC SOCIETY. Eugene Allen Smith, State Geologist.

OZONE MANUFACTURE AND THE ENERGY RELATIONS IN ITS FORMATION. P. C. Saunders, Howard College.

ECOLOGICAL SURVEY OF THE FLORA OF THE BIRMINGHAM DISTRICT. Sumner A. Ives, Howard College.

ABSTRACTS OF PAPERS PRESENTED AT THE MOBILE MEETING APRIL 3rd, 1925.

THE NEW THEORY OF VALENCE APPLIED TO HALOGEN PHENOLS AND NAPHTHOLS. John R. Sampsey, Howard College. *University of Chicago Science Series* 1923.

After giving a brief historical treatment of the Lewis theory of valence, it is shown that this new theory can be applied successfully to the interpretation of the results obtained by heating halogen phenols and naphthols in acid solution. In most organic compounds of the aromatic and naphthalene series, halogen atoms attached to carbon are not easily replaced by hydrogen on hydrolysis. In certain compounds of these series, however, the halogen can be so replaced. The halogen removed appears combined in the form of hypohalous acids, or it resubstitutes in the organic compound to give poly-halogen compounds. Halogens which react in this way have been called positive halogens. It has been shown that in a number of compounds halogens which are *ortho* and *para* to one hydroxyl group respond relatively readily to the test for positive halogens. On the basis of the electronic theory of valence as applied to organic compounds, it is reasonable to expect that iodine and bromine atoms *ortho* and *para* to two hydroxyl groups that are *meta* to each other, will react more positively than the halogens in the monohydroxyl-compounds. The data presented on more than a dozen halogen phenols and naphthols support this prediction.

SOME NEW ASPECTS OF THE ETHER. Mary Robinson, Phillips High School.

The sun and the planets are believed to be made of the same material. We know the earth to be a big magnet sending out a spherical field of lines of magnetic force for a great distance. We assume that the other planets are similar magnets with similar fields of force.

There is a theory that the earth has an iron core. This would make a coil or armature. Now picture inter-planetary space permeated by lines of force from the planets and their satellites; this would give a complex dynamo with both magnets and magnetic field; consider each rotating body an arma-

ture breaking lines of force by its double motion. Would not "static electricity" be generated just as electricity is generated in a dynamo? What becomes of all this electricity? Could this electricity be the "ether" of our solar system and the medium of transmission of light and radio waves?

This, in brief, is the theory, and some of the questions raised in the paper.

CARBON MONOXID POISONING, WITH REPORT OF NEW TESTS FOR CARBON MONOXID IN THE BLOOD. By Walter Clinton Jones, Professor of Zoology, and James O. Prinkston, Instructor in Biology, Birmingham-Southern College, Birmingham.

1. The diagnosis of carbon monoxid poisoning rests mainly upon (a) history of possible exposure of the patient to this gas, (b) symptoms of narcotic poisoning, (c) presence of carbon monoxid in the blood either before or after death, and (d) at autopsy (1) preservation of the body from decomposition, (2) bright red color of all the organs and tissues, and (3) the fluidity of the blood.

2. The most frequent error in the diagnosis of CO poisoning is the mistaking it for various diseases. This mistake is due chiefly to the fact that the physician usually forgets to place this malady in his list of possibilities in connection with the diagnosis of any given case.

3. Of the older tests for the demonstration of CO in the blood, we recommend especially those with potassium ferrocyanide, mercuric chloride, zinc chloride, ammonium sulfid, lead subacetate, tannic acid, picric acid, heat, and simple dilution.

4. The writer's tests are made with (a) phenol (1) alone (diluted or undiluted), (2) with acetic acid; (b) with alum (1) alone, (2) with potassium bicarbonate, (3) with acetic acid; (c) with acetic acid and sodium bicarbonate (foam test); (d) with methyl alcohol; (e) with aniline; (f) with ferric chloride, and (g) with potassium bicarbonate. Of these tests, those with phenol and with alum are the best.

5. More than one test should be made on each unknown specimen.

6. Each test should be made several times with different amounts of the reagents and various dilutions of the blood.

SOME NEWER PHASES OF DAIRY BACTERIOLOGY. W. A. Whiting, Birmingham-Southern College.

A brief presentation was made of the direct microscopic method for the determination of bacteria in market milk. The advantages and disadvantages of this method were discussed together with its application to the sanitary inspection of milk and milk products.

It was concluded that this method could be used satisfactorily to determine the different types of bacterial contamination found in milk, thereby affording a very easy and rapid method for the tracing of contamination to its source.

TEMPERATURE RELATIONS AND SEASONAL GROWTH OF WINTER LEGUMES. J. F. Duggar, Alabama Polytechnic Institute.

The data, presented by means of charts, represents a part of that collected by the writer in experiments made on the farm of the University of California in the Central Valley of that state, near Davis, while the writer was on leave of absence from the Alabama Polytechnic Institute. Many species of **Vicia**, **Lathyrus**, **Medicago**, **Melilotus**, **Trifolium**, and miscellaneous legumes were planted, each at various dates from October to February, so as to subject the seedlings to diverse climatic conditions. The climatic factors were recorded in detail and compared with growth, blooming time, rate of development of root nodules, etc.

Among the tentative conclusions reached were the following:

1. In periods receiving equal amounts of heat, as measured by the sums of daily mean temperatures above 40° F., growth was in general greater for the spring periods than for corresponding isothermal periods in winter or in winter and early spring. This is believed to be due not alone to other climatic factors than heat,—which are not discussed in detail in this paper,—but also to differences in the size and condition of the plants when subjected to the varied atmospheric conditions.

2. In general, blooming time of most species was found to conform in accordance with Garner and Allard's findings—to the length of day more closely than to any other easily observable climatic factor. It seems desirable and possible to analyze favorable day length into its factors that favor the blooming date of a particular species of plant.

3. The sums of mean daily temperatures above 40° F. from time of emergence of seedlings to beginning of bloom were presented for each of a number of species.

4. The intervals between blooming dates of the same species when planted early and when planted late were extremely small in comparison with the time intervals between the dates of planting each kind.

5. Those species requiring the longest time from planting to blooming were in general the kinds of which the blooming dates were closest together from early and from late planting. Striking examples are alfalfa and Egyptian clover.

6. The several species within any one genus, as *Vicia* or *Trifolium*, varied in the promptness with which the formation of root nodules began, and also varied widely in the time required for nodulation to become general.

THE DECOMPOSITION OF CHLOROPHYLL.

Wright A. Gardner, Auburn.

Motor exhaust, fumes from oil stoves, and ethylene gas, have been used by other workers, with varying success in the removal of the green color from the rinds of lemons, California oranges, and satsuma oranges.

Acetylene in the proportion of 1 part to 4000 of air has been found quite as effective as any of the gases mentioned above, while pure oxygen has been found to be more effective and more rapid in removing the chlorophyll from the rinds of satsuma oranges.

A NEW INDICATOR FOR TITRATIONS WITH POTASSIUM DICHROMATE.

J. G. Riddle and J. R. Sampey, Howard College.

This investigation was undertaken to determine the applicability of the new indicator diphenylamine to the analysis of iron ores of the Birmingham District. Knop (J.A.C.S.46,263 [1924]) has shown that this indicator has a marked advantage over the usual potassium ferricyanide method for the titration of iron with potassium dichromate in that the indicator may be placed directly in the solution being titrated. In our investigation we found that the presence of other ions greatly influenced the color changes of the indicator. When zinc was added to reduce any ferric ions formed during the solution of the ore (or even of a pure iron wire used in the standardization of the dichromate solution), we found the following gradual change in the color of the solution: from a light green to a

dark green and then through a light blue to a dark blue and finally to a deep purple; in no case was the change of color sharp enough to give a reliable end-point. Changing the amounts of zinc used had no effect on the color changes, but we did secure a fairly sharp color change when the concentration of the ferrous ions was considerably less than Knop specifics.

INFLUENCE OF PLANT DISEASES IN LOWERING THE FEEDING VALUE OF JOHNSON GRASS HAY. By Emerson R. Miller and M. A. Barnes, Auburn.

In grading Johnson grass hay one of the points to be considered is color. Mr. C. G. Baker furnished for analysis three samples: a green, a yellow or brownish yellow and a red sample.

Insofar as color is concerned the green represents the normal, the yellow or brown results from improper curing or cutting too late while the red color is due to the presence of a plant disease.

The three samples were analyzed with results as shown below:

	Green	Yellow	Red
Moisture	3.82	4.53	4.84
Ash	7.91	6.73	6.68
Ether extract.....	3.57	2.15	3.33
Protein	11.28	9.38	4.72
Crude fiber.....	30.98	31.43	29.25
Nitrogen free extract.....	42.44	45.78	51.18
Total Nitrogen.....	1.804	1.501	0.755
Ammonia Nitrogen.....	0.014	0.012	0.013
Non-protein Nitrogen.....	0.271	0.194	0.117
Phosphorus in the soluble ash.....	0.049	0.025	0.024

The results of our analysis show that the main effect of the plant disease was to cause a decided lowering of the protein content of the hay. So far as quantity only is concerned this is noticeably offset by an increase in the carbohydrate content.

If all the plants making up a given sample of hay were attacked by this same disease to the same extent as our red sample the loss of protein would be over 58% as compared with a prime green sample of hay.

We have also found a decided decrease in the protein content of a sample of sorghum which was badly attacked by

a disease, apparently the same as that which attacks Johnson grass.

The following results were obtained:

Green	16.68 %	protein
Red	10.70 %	protein

THE NON-PROTEIN NITROGEN OF THE VELVET BEAN. By Emerson R. Miller and M. A. Barnes, Auburn.

It is known that plants generally contain variable amounts of non-protein, non-assimilable nitrogen compounds. In some plants these compounds of nitrogen are relatively large, though as a rule the plants used as feed stuffs contain relatively small amounts of such nitrogenous compounds.

In the case of the velvet bean, however, the amount of this non-assimilable nitrogen is greater than usual and a correction for it should be made in the estimation of protein.

The non-protein nitrogen of the velvet bean as far as we are able at present to determine consists of a nitrogenous base and an amino acid, namely, 3-4-dihydroxyphenylalanine, the latter predominating. This amino acid appears to be eliminated almost entirely in the urine and consequently is not utilized as a food.

For the Early Speckled variety results obtained by several methods indicate the presence of 0.45 to 0.50 per cent of non-protein nitrogen. By the usual method of estimating protein this would indicate approximately three per cent more protein than is actually present in the velvet bean.

MOBILE COUNTY FAUNA AND FLORA. By H. P. Loding.

The diversity and richness of our local flora demonstrated in Dr. Mohr's "Plant Life of Alabama" gave promise of a correspondingly rich fauna, and the Charles Mohr Natural History Society was organized fifteen years ago to study this field, with results as follows: Reptiles and Amphibians: ninety species recorded of which one snake proved new to science. The known Land Sheels have been greatly increased by the late L. H. McNeill. The beetle fauna has yielded over two thousand species, with several families yet to be worked. Thirty-eight species have been described by specialists as new to science, two of which were also new genera, and material in hand promises additional forty-five new species. The Butterflies and Moths, as studied by Dukes and VanAller,

will make a large list with several species new to science. Other orders of insects are proving equally abundant and interesting. The Marine fauna, practically untouched, is a wonderful field for future workers. The published work of Arthur Howell on Birds and Mammals of Alabama also emphasizes the exceptional richness of Mobile County zoologically.

DEVELOPMENT OF SPEED AND ACCURACY IN TYPEWRITING. Roy E. Hoke, Birmingham-Southern College.

THE ACTIVATION OF HYDROGEN IN ORGANIC COMPOUNDS. Roger W. Allen, Howard College.

ARE WINTERS BECOMING COLDER? Mary Robinson, Phillips High School, Birmingham.

LABORATORY METHODS OF INVESTIGATING JOHNSON GRASS HAY. K. G. Baker, Alabama Polytechnic Institute.

ABSTRACTS OF PAPERS PRESENTED AT THE BIRMINGHAM MEETING MARCH 26th AND 27th, 1926.

STUDIES ON THE SYNTHESIS AND ELIMINATION OF CERTAIN BILE COMPONENTS IN OBSTRUCTIVE JAUNDICE. J. L. Brakefield and Carl L. A. Schmidt. *J. Biol. Chem.* **67**, 523-45.

Jaundice was produced by ligation and subsequent resection of the common bile duct. Both bile acid and bile pigment appeared in the urine immediately following the onset of jaundice. Bile acid decreased and finally reached a very small excretion. Bile pigment decreased to a low but constant level, indicating extra hepatic formation of pigment. Ability of the animal to detoxicate BzOH was lessened in the dog and rabbit: in the dog this was indicated chiefly by decreased output of benzoylglucuronic acid. N and S output increased but approached a normal level after one to two weeks. S increase was chiefly due to neutral S fraction. N excretion increased toward end of experiment.

Exps. continued up to twelve weeks.

RATE OF NODULATION AND GROWTH OF LEGUMINOUS PLANTS AS AFFECTED BY TEMPERATURE. J. F. Duggar, Alabama Polytechnic Institute.

Several scores of winter legumes were planted at Auburn, Alabama, at four different dates between September 18, 1924, and February 24, 1925, so as to subject the seedlings of each to varying climatic conditions. Meteorological data were recorded and plotted against the amount of growth, rate of nodulation, etc.

Generally the total yield per acre decreased as the date of planting became later. However, the later growth periods, that is, those receiving in the spring the greater proportion of their total amount of heat, afforded the larger growth per unit of total heat above 40° F. As an example of relative growth in two contrasted isothermal periods, the yields of dry matter per acre for four species of *Vicia* and *Lathyrus* in the later period, November 11 to May 8, 1925, averaged 115 per cent in excess of that made by the same species in the earlier isothermal period, September 23 to December 27, 1924.

Likewise seven species of *Vicia*, *Lathyrus* and *Pisum* averaged 134 per cent in the later period, November to May 8, 1925, as compared with 100 per cent for the earlier isothermal period, September 23 to March 22, 1925.

Variations in other weather factors, such as hours of sunshine, and hours of daylight, which are also recorded and charted, are suggested as among the possible contributory causes of the apparent superiority of spring heat for growth, as doubtless is also the relative size and condition of the plant when it receives the greater part of its supply of heat.

Tabulations were presented showing in detail the sums of daily mean temperatures above 40° F. required to bring to the stage of generalized tubercle formation each of many species of legumes when planted at widely separated seasonal dates. Taking hairy vetch as apparently typical of many species, one year's experiment suggests that:

(a) The rate of nodulation per degree of daily mean air temperature increases as the average mean daily temperature increases.

(b) The rate of nodulation per degree of heat in the soil varies with the afternoon temperature of the soil taken at a depth of two inches.

(c) An hour of actual sunshine seemed to have quite diverse effects in different months in stimulating the development of root nodules, suggesting the possibility of correlation between the intensity (as well as the duration) of sunshine and the efficiency of sunshine in promoting growth and root nodule formation. On the other hand, an hour of daylight seemed to be more nearly uniform in its accompanying rate of tubercle formation, regardless of the season.

A RECENT DISCOVERY OF A RICH DEVONIAN FAUNA IN ALABAMA (ILLUSTRATED). Walter B. Jones, Assistant State Geologist.

In November, 1925, the writer accompanied Charles Butts, of the United States Geological Survey, on an excursion into Northeast Alabama in search of the source of a collection of Devonian fossils made many years ago and simply labeled "near Piedmont, Alabama." In an old quarry once worked by the National Cement Company, located one and a half miles southeast of Ragland, St. Clair County, were found some very thin shales and impure limestones which are abundantly fossiliferous, carrying trilobites, corals and brachiopods which have a strong Hamilton affinity, although some of the fossils suggest Onondaga age. There is no doubt of

the Middle Devonian age of the beds, although a detailed study of the fossils must be made before a final decision can be reached as to whether the beds are Onondaga or Hamilton. There is an unconformity between the Devonian beds and the overlying Fort Payne Chert of the Mississippian, where several thousand feet of Upper Devonian and Lower Mississippian formations are missing. The unconformity below the Devonian beds is also very great, since there is absent all of the formations above the Little Oak Limestone, of Chazy or Ordovician age, all of the Silurian and the lower part of the Devonian. Another interesting feature is that the beds apparently conformable, in spite of the great breaks, and the lower break is so thoroughly cemented that hand specimens can easily be broken across the contact, which is as sharp and even as a carpenter's joint.

COLOR FORMATION IN THE VELVET BEAN. By Emerson R. Miller, Auburn.

When velvet beans are powdered and mixed with water a pink colored substance is very quickly formed, sometimes in less than half a minute, depending upon the fineness of the powder. The color passes through several shades of red and brown and finally becomes black. If the seed coats be removed from the beans and the powdered interiors, alone, mixed with water no coloration occurs; neither do the seed coats, alone, show any color formation. The interior of the seed of any species or variety of velvet bean (so far examined), when mixed with the seed coat of the same or of any other species or variety, in the presence of water, produces this same color phenomenon.

This color formation is due to an oxidizing enzyme, contained only in the seed coat, acting upon a chromogen, 3-4-dihydroxyphenylalanine, which exists only in the interior of the bean.

The chromogen is readily soluble in water, but the oxidizing enzyme is, apparently, insoluble. Consequently color formation takes place within the seed coat only. With the exception of the final black substance, these colored compounds are all soluble in water and diffuse rather rapidly into the surrounding liquid.

White seed coats have greater oxidizing power towards this chromogen than the speckled ones, while the black are weakest in this respect.

In nature as the beans develop there seems to be a mechanism which regulates diffusion of the chromogen into the

seed coat. In the black bean diffusion occurs uniformly, in the speckled unevenly and in the white the chromogen does not pass into the seed coat at all.

OBSERVATIONS OF THE RELATION OF THE DISTRIBUTION OF ATMOSPHERIC PRESSURE TO THE OCCURRENCE OF STATIC. Patrick H. Smyth, Weather Bureau.

In this paper the writer gives the results of personal investigations and observations of atmospheric static, and cites cases of definite relation of static to meteorological conditions. The investigations extended over a period of about five years.

The writer notes that the relationship is more marked from autumn to late spring, than it is from late spring to autumn. That pressure distribution associated with good reception, and an absence of static interference, during autumn, winter and much of spring, was sometimes found to be associated with poor reception and more or less static during other periods of the year.

The writer describes many typical cases, and points out the fact that the cause of static interference needs not be a radio frequency, oscillatory impulse, and that it may differ wholly from the electromagnetic waves in use in radio transmission. In this connection attention is called to the effects of lightning.

Notes are given associating atmospheric pressure distribution with radio reception.

The writer believes that a high percentage of verification may be obtained of forecasts of conditions favorable or unfavorable for radio reception, such forecasts to be based on the data appearing on the daily weather map.

A BRIEF ACCOUNT OF METEOROLOGICAL OBSERVATIONS AND RESEARCHES IN ALABAMA. By Jesse W. Smith, Montgomery.

Our earliest records concerning the weather in Alabama were furnished by W. H. Gardner, of Mobile. Much of his data were obtained from French and Spanish reports and they covered the period from 1701 to 1885. The first systematic instrumental observations were started in 1829, under the direction of the Surgeon-General, U. S. Army, and included readings of the dry bulb thermometer and records of

rainfall, Lovell, Jennings, and Osborne were the chief men who accomplished this pioneer work. They were followed by Tutwiler, Wright and others. These records were nearly all published by the Surgeon-General's office or by the Smithsonian Institution, chiefly the latter.

In 1870, a special National Weather Service was established; and the Signal Service of the Army was designated to carry on the work. The first stations under this new management were opened at Montgomery and Mobile. During the last twenty-five years, stations were established also at Birmingham and at Anniston, so that now there are four in the state that are fully equipped with the latest meteorological instruments, many of them self-recording.

In 1882, a special weather report was inaugurated for the cotton industry. Many valuable data were thus obtained. In addition to the four large stations just mentioned, Mell, in 1884, enlisted the aid of a corps of about twenty interested persons, distributed over the state, who supplied their own instruments; and most of them worked without pay. In later years, this number was gradually increased to about seventy. These public spirited citizens deserve great credit for their part in helping the progress of science. Mell also started the publication of a monthly bulletin of the Alabama Weather Service, which has been continued to the present time.

In 1898, the work of the Signal Service was transferred to the Weather Bureau of the U. S. Department of Agriculture. Mell was succeeded by Dudley, who, in turn, was followed by Chaffee. Then Patrick H. Smyth, the present incumbent, took up the work in 1909. One of the most recent studies is that of Stevens, on tornadoes, in 1925.

EXPERIMENTAL UNILATERAL LIGATION OF THE URETER, WITH SIMULTANEOUS DECAPSULATION OF THE KIDNEY OF THE SAME SIDE. By Walter C. Jones, Professor of Zoology; Joseph A. Abercrombie, and Rogers L. Hill; Birmingham-Southern College, Birmingham.

1. Kind and Number of Animals.—We have operated upon thirty cats and six guinea pigs to date and are able to report with some degree of finality on about twelve cats at present. There is little reason to think that different results would be obtained with other genera or families.

2. Morbidity.—The total morbidity has been about 17 per cent. Two of the five animals that developed serious illness were in a state of advanced pregnancy and one of these

was also very poorly nourished. One of the remaining three was in a state of impaired nutrition at the time of operation. This leaves only two cats whose illness can be attributed chiefly or solely to the unilateral obstruction and renal decapsulation. Thus the true morbidity is reduced to about 7 per cent.

3. Mortality.—Six animals died; two on the table from anaesthesia; and one, forty-five minutes after operation, from anaesthetic, shock, and advanced pregnancy. The other three died six days, twenty days and twenty-six days after operation, from intussusception, from hernia and peritonitis, and from inanition in a state of advanced pregnancy, respectively. Thus only two animals can be said to have died from causes arising solely or chiefly from obstruction of the ureter and decapsulation of the kidney. This reduces the true mortality to 7 per cent or less.

4. Abdominal Wound.—This healed normally in all but six cases; and in only one of these was the infection severe.

5. Kidneys and Ureters.—The principal finding in this connection is the small amount of enlargement of the kidney observed during the first two months. In some instances, there was practically none; in others it was slight, and at most it was not more than one hundred per cent above normal. These observations contrast with the result of ureteral obstruction alone, which produces nothing but dilatation during the first sixty days, and in large degree, sometimes as much as one hundred per cent. Thus it seems evident that the added factor of decapsulation hastens very markedly the development of renal atrophy following complete obstruction.

THE INVESTIGATION OF TANTALUM AS A CATHODE METAL IN PLACE OF PLATINUM IN THE ELECTROLYTIC DETERMINATION OF METALS.
Franklin P. Lasseter and James R. Withrow.

COPPER

In this work a Ta dish was used as the cathode and container. It was found that Ta can be substituted for Pt as a cathode metal in practically every case where Cu has been determined electrolytically on the latter. The peculiar properties of Ta, especially its absolute resistance to chemical corrosion, would seem to make its commercial adaptation as a substitute for Pt advisable. Its first cost is much less, being about one-half or less than half the cost of gold, and in addition the rate of corrosion of Ta in contact with chemicals is practically nothing compared with that of Pt.

MODERN THEORIES OF ATOMIC STRUCTURE.

J. R. Sampey and E. McDonough, Howard College.

The Lewis and Bohr theories of atomic structure are briefly presented. The interpretations of chemical phenomena that each theory best interprets are considered more at length. The following applications to the Bohr atom are developed: (a) Explanation for the similarity of the rare earths. (b) Explanation for the electromotive series of metals and non-metals. (c) Explanation for the relation of the electromotive series to the periodic table (1). (d) The nature of the orbits of valence electrons in metals and non-metals. (e) The tetravalence of carbon and its stability.

The Lewis atom is applied to the following: (a) The nature of polar and non-polar bonds. (b) Baeyer's strain theory. (c) The structure of crystals. (d) Chemical affinity. (e) Positive and negative elements. (f) Acids and bases.

The weaknesses of each of the theories is pointed out, and a possible reconciliation of the two views is developed.

(1) Sampey, Jour. Chem. Education 4,228.

CARBON-HALOGEN LINKAGE: ACID HYDROLYSIS OF CERTAIN HALOGEN PHENOLS AND NAPHTHOLS. John R. Sampey, Howard College.

This is the second paper of the series presented on the acid hydrolysis of halogen phenols and naphthols. More quantitative data from a kinetic point of view is given on the reaction that has been used as a test for positive halogens. The hydrolysis appears to be a reaction of the first order; fairly steady velocity constants are obtained when data on the removal of the halogens is substituted in the equation for a first order reaction. The significance of this is pointed out in a discussion of the mechanism of the reaction.

The rate of removal of the halogen atoms depends upon the concentration of the hydrogen ions; an increase in the hydrogen ion concentration causes an increase in the rate of hydrolysis.

BLOOD COAGULATION WITH SPECIAL REFERENCE TO A NEW ALKALOID. James Alto Ward, Howard College.

The new alkaloid, which I want to mention in this paper, is obtained from the plant—*Ceanothus Americanus*. It is a stable, non-toxic, easily standardized, alkaloid, which is classed as a coagulant. Most of the work on this alkaloid

has been done in the science departments of the University of Illinois. We have had the opportunity in my laboratory of studying its action in hemophilia. The following is a report of a case of hemophilia recently studied:

The study was made on Johnny Acton, age 5 years, Birmingham, Ala. This patient has had in the past numerous hemorrhages from slight abrasions and has, at times, had to have blood transfusions to save his life. In his family history, there have been two uncles and two cousins who have bled to death. We chose him as a typical hemophiliac to study the effects of Ceanothyn on his coagulation and bleeding time.

Before Ceanothyn was given, a specimen of blood was taken, 5 cc. of which was to be used for the chemical analysis and 2 cc. was used for blood Wassermann, which showed a four plus reaction. At the same time, blood was taken for the count, which showed the following:

Red blood cells:	5, 385,000 P.M.N.	51.5	Lymph	44.5
White blood cells:	5,850 P.M.E.	.5	L.M.	2.5
Hemoglobin:	75% P.M.B.	.1		
Differential:	200 cells counted.			

At 9:30 A. M., blood, obtained by pricking the finger tip, showed the bleeding time was three and one-half minutes and the coagulating time was thirty-six minutes. This was repeated at one hour intervals until twelve o'clock, getting the above mentioned average. At twelve o'clock, eight grams of Ceanothyn was given by mouth. This dose was repeated every sixty minutes until four doses were given. The coagulating and bleeding time were tested every hour from 1 P. M. until 6 P. M.

The bleeding time came down to one minute and forty-five seconds by 4 o'clock. The coagulating time did not change materially until after 4 o'clock; but, by six, had come down to eleven minutes. A 5cc. sample of blood was obtained to be used for chemical analysis.

In this case, there was a quicker change in the effect of Ceanothyn on bleeding time than on coagulating time, which would give one the impression that Ceanothyn probably left the blood vessels by the process of osmosis and affected the tissue juices in some way as to affect the patient's bleeding time more rapidly than it affected the coagulation time in the blood stream. This may be due to some reaction with the ferment in the tissue juice, which plays a part in forming a blood clot.

The coagulation time was arrived at by the capillary tube method and the bleeding time was arrived at by stabbing the finger a uniform depth and blotting with a standard blotting paper at intervals of thirty seconds until bleeding ceased.

FORESTRY AS APPLIED SCIENCE. Page S. Bunker, State Forester.

Forestry is change made and maintained in the growth and use of forests, intentionally resulting in a greater continuous and profitable production of economic timber values than would accrue without such change. Science, following the definition of Earl Pearson, is the classification of facts and the recognition of their sequence and relative significance. The scientific method is not peculiar to any class of phenomena or of workers, but is applicable to all classes of entities or concepts.

The customary division of forestry into the main branches of policy, protection, silviculture, management and utilization may be recognized as legitimate. These various branches draw heavily upon the fields of psychology and the social sciences, mathematics, engineering, meteorology, chemistry, entomology, ecology, bacteriology and plant pathology. Forest management is based on economic laws that affect business in general. Utilization requires application of the principles of civil, mechanical, chemical and industrial engineering.

A complete exposition of the interlocking of pure and applied science with forestry as a system of economic production would require an extended treatise. For immediate purposes we may merely thus indicate briefly the internal structure of forestry as applied science and point out its dependence upon scientific method for substantial progress.

ALKALINE ELECTROLYTIC IRON. Stewart J. Lloyd, University of Alabama.

THE SERVICE RENDERED TO SCIENCE BY MATHEMATICS. Frank Ordway, Phillips High School, Birmingham.

ENTOMOLOGICAL RESEARCH. J. M. Robinson, Alabama Polytechnic Institute.

THE FERTILIZER RESOURCES OF ALABAMA. B. B. Ross, Alabama Polytechnic Institute.

TYPES OF RINGWORM OF THE FEET IN SOME OF THE SOUTHERN STATES. Virginia C. Brogdon, Howard College.

NEW BACTERIOLOGICAL MILK TECHNIQUE. George A. Dennison, Birmingham-Southern.

CORRELATION OF HIGH SCHOOL AND COLLEGE MATHEMATICS. Theophilus R. Eagles, Howard College.

ECOLOGICAL SURVEY OF THE MENTONE REGION. Sumner A. Ives, Howard. College

THE CONTROL OF FLY BOURNE INFECTIONS THROUGH CONTROL OF FLY REPRODUCTION. C. H. Kibbey.

X-RAYS AND CRYSTAL STRUCTURE. Louis K. Oppitz, Howard College.

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Bell, Leslie M. (Miss)	1424 Univ. Ave., Tuscaloosa, Ala.
Benham, A. S.	800 S. 20th St., Birmingham, Ala.
Blair, A. W.	1427 Univ. Ave., Tuscaloosa, Ala.
Bologna, Angelo	University, Ala.
Boydén, E. A.	37 Audubon, Tuscaloosa, Ala.
Brakefield, J. L.	Howard College, Birmingham, Ala.
Brackenridge, C. G.	Box 1835, University, Ala.
Brooks, Clyde	School of Medicine, University, Ala.
Bunker, P. S.	500 Dexter Ave., Montgomery, Ala.
Burke, Mary K. (Miss)	Manly Hall, University, Ala.
Burn, Harry	1410 S. 16th Ave., Birmingham, Ala.
Callaway, J. L.	University, Ala.
Camp, Horton	13th Ave., Tuscaloosa, Ala.
Causey, O. S.	Howard College, Birmingham, Ala.
Carmichael, E. B.	University, Ala.
Clark, Paul	University, Ala.
Clark, B. G.	University, Ala.
Coe, G. D.	513 12th Ave., Tuscaloosa, Ala.
Colley, James O.	University, Ala.
Conwell, H. E.	T. C. I. Hospital, Fairfield, Ala.
Cory, M. D.	Box 337, Gadsden, Ala.
Cudworth, J. R.	University, Ala.
Dahlene, Oscar	University, Ala.
Daugherty, D. V.	1001 Univ. Ave., Tuscaloosa, Ala.
Davis, A. H.	University, Ala.
Davis, S. D.	University, Ala.
Doner, R. D.	Auburn, Ala.
Duggar, J. F.	Auburn, Ala.
Duggar, J. F., Jr.	Hope Hall, University, Ala.
Eberhardt, Margaret (Miss)	Phillips H. School, Birmingham, Ala.
Eckert, T. S.	Birmingham-Southern College, Birmingham, Ala.

Evans, R. E.	University, Ala.
Farmer, C. M.	275 Brundidge, Troy, Ala.
Farable, R. L.	University, Ala.
Fertig, G. J.	4301 Cliff Road, Birmingham, Ala.
Foley, J. O.	Department of Anatomy, University, Ala.
Foust, Ruth	University, Ala.
Gandrud, B. W.	406 19th Ave., Tuscaloosa, Ala.
Gardner, W. A.	Auburn, Ala.
Garrard, R. L.	Box 1001, University, Ala.
Goldman, Benjamin	University, Ala.
Goldman, Louis	University, Ala.
Goldman, Max D.	University, Ala.
Graham, J. Y.	University, Ala.
Graves, Stuart	University, Ala.
Griffin, I. H.	University, Ala.
Haigler, Doris	5111 13th Ave., Birmingham, Ala.
Halton, W. L.	University, Ala.
Hampton, Lawrence	A. P. I., Auburn, Ala.
Hancock, David	Box 826, Birmingham, Ala.
Harkin, D. C.	A. P. I., Auburn, Ala.
Harris, J. R.	1230 S. 17th, Birmingham, Ala.
Heath, H. C.	1005 Fairview Ave., Montgomery, Ala.
Hess, G. W.	8009 Berney, Birmingham, Ala.
Hill, D. S.	University, Ala.
Hobson, S. A.	Jackson, Ala.
Hodges, Robert S.	University, Ala.
Holt, Rebecca A. (Miss)	Box 1085, University, Ala.
Howse, B. C.	333 38th, Fairfield, Ala.
Hunt, T. E.	Box 1594, University, Ala.
Hunt, T. E. (Mrs.)	Box 1594, University, Ala.
Hyde, J. W.	Auburn, Ala.
Ingram, Lillian	Box 1941 Univ. Ave., Tuscaloosa, Ala.
Jones, E. V.	Birmingham-Southern College, Birmingham, Ala.
Jones, H. D.	Box 63, University, Ala.
Jones, W. B.	University, Ala.
Jones, W. C.	T. C. I. Hospital, Birmingham, Ala.
Kaufman, P.	University, Ala.
Keinigsberg, Aaron	University, Ala.
Kennedy, J. J.	University, Ala.
Kille, F. R.	Birmingham-Southern College, Birmingham, Ala.
Killebrew, C. D.	A. P. I., Auburn, Ala.
Knapp, Bradford	A. P. I., Auburn, Ala.
Kossner, J. L.	1000 13th St., Tuscaloosa, Ala.
Kralick, T. H.	University, Ala.
Lewis, F. A.	University, Ala.
Lloyd, S. J.	University, Ala.

- Mabrey, G. S. _____ University, Ala.
 McBurney, Ralph _____ 1519 13th St., Tuscaloosa, Ala.
 MacDenzie, J. T. _____ 4300 Glenwood Ave., Birmingham, Ala.
 Mancill, Julian D. _____ University, Ala.
 McVay, T. N. _____ University, Ala.
 Martin, H. M. _____ A. P. I., Auburn, Ala.
 Montgomery, J. P. _____ University, Ala.
 Moore, E. G. _____ University, Ala.
 Moore, W. A. _____
 _____ Birmingham-Southern College, Birmingham, Ala.
 Moss, S. S. _____ University, Ala.
 Murry, Elizabeth (Miss) _____
 _____ Birmingham-Southern College, Birmingham, Ala.
 Naftel, L. A. _____ Auburn, Ala.
 Narvins, S. R. _____ 1112 8th Ave., Tuscaloosa, Ala.
 Oberdoerfer, Benedict _____ St. Bernard College, St. Bernard, Ala.
 Ott, W. P. _____ University, Ala.
 Owings, W. J. B. _____ 516 13th Ave., Tuscaloosa, Ala.
 Pace, Marius _____ University, Ala.
 Palmer, G. D. _____ 1001 University Ave., Tuscaloosa, Ala.
 Payne, W. G. _____ University, Ala.
 Pinkston, J. O. _____ 732 9th Ave., W., Birmingham, Ala.
 Pirenian, Z. N. _____ A. P. I., Auburn, Ala.
 Poor, R. S. _____ Birmingham-Southern College, Birmingham, Ala.
 Powell, P. P. _____ 254 South Gay, Auburn, Ala.
 Pruitt, C. M. _____ Ross Apts., Tuscaloosa, Ala.
 Robinson, J. M. _____ 303 Armstrong St., Auburn, Ala.
 Robinson, Mary E. (Miss) _____
 _____ 430 Princeton Ave., Birmingham, Ala.
 Sampey, John R. _____ Howard College, Birmingham, Ala.
 Sellmann, A. H. _____ 3220 Seymore Ave., Bronx, N. Y.
 Sell, William _____ University, Ala.
 Shirley, Katherine _____ University, Ala.
 Smith, J. W. _____ 222 S. Lawrence St., Montgomery, Ala.
 Smith, Septima _____ 711 Queen City Ave., Tuscaloosa, Ala.
 Smyth, P. H. _____ Weather Bureau, Montgomery, Ala.
 Spieth, A. M. (Miss) _____ Livingston, Ala.
 Stabler, A. C. _____ University, Ala.
 Stone, P. T. _____
 _____ Womans College of Alabama, Montgomery, Ala.
 Swann, Theodore _____ 930 Brown-Marx Bldg., Birmingham, Ala.
 Towery, Thera Mae (Miss) _____
 _____ Howard College, Birmingham, Ala.
 VanAlder, T. S. _____ 902 Charleston St., Mobile, Ala.
 Veal, J. R. _____ 1918 8th St., Tuscaloosa, Ala.
 Walker, J. H. _____ University, Ala.
 Walker, Catherine (Mrs.) _____ University, Ala.

Wallace, A. W.-----South Wilson Blvd., Nashville, Tenn.
 Wallace, Roberta T. (Mrs)-----
 -----1512 S. 33rd St., Birmingham, Ala.
 Watt, Lucile-----University, Ala.
 Webb, Virginia E. (Miss)-----
 -----619 11th St., West, Birmingham, Ala.
 Whiting, W. A.-----
 -----Birmingham-Southern College, Birmingham, Ala.
 Wilmore, J. J.-----Auburn, Ala.
 Wilson, Arnold-----R. F. D. 1, Quinton, Ala.
 Wing, Herbert-----Howard College, Birmingham, Ala.
 Wooten, B. A.-----University, Ala.
 Whitehurst, W. L.-----University, Ala.
 Xan, John-----Howard College, Birmingham, Ala.

PAPERS PRESENTED AT THE FOURTH ANNUAL
MEETING OF THE ALABAMA ACADEMY OF
SCIENCE, APRIL 8th AND 9th, 1927, AT
BIRMINGHAM

Friday Session

"An Enzyme in the Rinds of Oranges," W. A. Gardner, Auburn.

"Root Nodule Formation on Winter Legumes as Influenced by Certain Meteorological Conditions," J. F. Duggar, Auburn.

"Cacti of the Southwest," O. S. Causey, Howard.

"A Balsam Method for Mounting Algae," F. Faulkner, Howard.

"The Relation of Hydrogen Ion Concentration to the Iodimetric Titration of Antimony," J. E. Gran, Birmingham-Southern.

"The Use of Acid Chlorides in Smoke Screens," T. R. Leigh and W. M. Jackson.

"Tantalum vs. Platinum as Cathode Metals in Certain Electrolytic Determinations, II," F. P. Lasseter, Howard.

"Rates of Reduction of Nitro Compounds," J. R. Sampey, Howard.

"The Summation of Certain Trigonometrical Series," W. A. Moore, Birmingham-Southern.

"A Solution of a Biquadratic Equation All of Whose Roots are Imaginary," G. W. Hess, Howard.

"Static Conditions and Atmospheric Pressure with Regard to Radio Reception, II," P. H. Smyth, Weather Bureau, Montgomery.

"Differences in the Time Lag of the Faraday Effect Behind the Magnetic Field in Various Liquids," Fred Allison, Auburn.

"The Results of Intelligence Tests on College Freshmen," R. E. Eliassen, Birmingham-Southern.

Saturday Session

"Sources of Diphtheria Infection and Some Suggestions as to its Control," J. A. Ward, Howard.

"A New Sedimentation Method for the Quantitative Estimation of Albumin in the Urine," W. C. Jones and A. Wilson, Birmingham-Southern.

"The Autolysis of Detached Tissue in Vivo," W. C. Jones and E. Rice, Birmingham-Southern.

"Morphological Changes in the Liver in Obstructive Jaundice," J. L. Brakefield, Howard.

"Benzoic Acid Detoxication in Man," J. L. Brakefield and R. Glenn, Howard.

"Experiments on the Respiration of the Fundulus Eggs," J. O. Pinkston, Birmingham-Southern.

**MINUTES OF THE FOURTH ANNUAL MEETING OF
THE ALABAMA ACADEMY OF SCIENCE, HELD
AT PHILLIPS HIGH SCHOOL, IN BIRMING-
HAM, APRIL 8th AND 9th, 1927**

The meeting was called to order at 9:15 A.M., April 8th, by Wright A. Gardner, of Auburn, Alabama.

Business:

(1) Secretary Sampey reported that the Alabama Academy of Science was officially affiliated with the A. A. S.

(2) Dr. E. A. Smith, of the University of Alabama, was appointed custodian of the library and permanent records of the Academy.

(3) It was voted that members who failed to pay dues for two years be automatically dropped from the Academy.

The Academy then turned to the reading and discussion of some very interesting papers.

The final meeting was called to order at 9:30, April 9th, by Vice-President W. C. Jones.

Business:

(1) The nominating committee proposed the following for election to office for the year 1927-1928:

President—John R. Sampey

First Vice-President, John Y. Graham

Second Vice-President—Harry F. Thomas

Secretary-Treasurer—James L. Brakefield

The report of the committee was unanimously adopted by the Academy.

(2) The following report of the Treasurer for the year ending April 9, 1927, was read and adopted.

Receipts

Balance from 1926 Treasurer's Report.....	\$ 46.18
Membership fees and extra copies of Abstracts sold.....	82.80
Total.....	\$128.98

Disbursements

Stationery	\$ 12.50
Stamps	14.50
Total	\$ 27.00

Bills Due

Printing of Programs.....	\$ 13.75
Printing of Abstracts.....	102.00
Total	\$115.75
Disbursements plus bills due.....	\$142.75
Receipts	128.98
Amount necessary to meet bills now due	\$ 13.77

JOHN R. SAMSEY, Treasurer.

Audited by F. P. Lasseter and A. S. Benham.
 Several interesting papers were read and discussed.
 On motion the Academy adjourned.

(Signed) JOHN R. SAMPEY, Secretary.

PAPERS PRESENTED AT THE FIFTH ANNUAL MEETING OF THE ALABAMA ACADEMY OF SCIENCE AT BIRMINGHAM, MARCH 30th AND 31st, 1928

Friday Session

"The Graphite Situation in Alabama," Walter B. Jones, University.

"The Faraday Time Lag as a Means of Chemical Analysis," Fred Allison, Auburn.

"Some New Effects of X-Rays upon Liquids and Glass," Fred Allison, Auburn.

"The Function of the Vermiform Appendix in Herbivora," Dick A. Fennell and W. C. Jones, Birmingham-Southern.

"The Geologic Making of Jefferson County," R. S. Poor, Birmingham-Southern.

"New Studies on Structure of Tillandsia Usneoides," O. S. Causey, Howard.

"Ammonium Phosphate Fertilizer," S. J. Lloyd and A. M. Kennedy, University.

"The Parathyroid Glands," Edward Larson, University.

"The Transmission of Insulin through the Placenta," Geo. T. Pack and Don Barber, University.

"The Mechanism of Diverticulosis of the Vermiform Appendix," Ross Buzzanca and Geo. T. Pack, University.

"The Transmission of Bismuth through the Placenta," Geo. T. Pack and Isabel Scharnagel, University.

"Selective Membranes for Dialysis," Harvey D. Royce, Howard.

"The Blooming Dates of Certain Winter Legumes as Influenced by Time of Planting," J. F. Duggar, Auburn.

"Metastable States of Mercury," J. H. Coulliette, Birmingham-Southern.

"Some Aspects of Crystal Growth," T. S. Eckert, Birmingham-Southern.

"The Influence of Ultraviolet Rays on Animals," Emmett B. Carmichael, University.

Saturday Session

"The Law of Thermal Expansion of Normal Liquids," J. F. Duggar, Jr., Hope Hall, University.

"Some Unusual Compounds of Antimony," John E. Gran, Birmingham-Southern.

"Further Studies on Intelligence Tests with College Freshmen," Reuben H. Eliassen, Birmingham-Southern.

"Positive Halogens and the Neutral Salt Effect," Helen Johnston and J. R. Sampey, Howard.

"Iodine Therapy," J. B. McLendon and J. L. Brakefield, Howard.

"Studies in Coprecipitation," Harry Passmore and J. R. Sampey, Howard.

"Protein Intake," J. A. Ferry and J. L. Brakefield, Howard.

**MINUTES OF THE FIFTH ANNUAL MEETING OF
THE ALABAMA ACADEMY OF SCIENCE, HELD
AT PHILLIPS HIGH SCHOOL, IN BIRMING-
HAM, MARCH 30th AND 31st, 1928.**

The meeting was called to order at 9:30 A.M., March 30th, by President John R. Sampey.

After a few brief remarks by the President the session was devoted to reading and discussing papers.

Just before adjournment at 12:20 P.M., the President appointed a nominating committee, consisting of W. A. Gardner, J. F. Duggar and R. S. Poor.

Following an Academy luncheon at the Tutwiler a short business session was held with President Sampey in the chair.

The minutes of the 1927 meeting were read and approved.

Dr. W. A. Gardner made a few appropriate remarks regarding the death of an honored member of the Academy, Dr. E. A. Smith, of the University.

The Treasurer's report was approved by the auditing committee (report appended).

On a motion of Dr. Duggar, seconded by Mr. Causey, it was voted to publish abstracts at intervals when funds and materials were sufficient.

Dr. Gardner moved and Dr. Poor seconded that the Secretary-Treasurer be a permanent office. The motion was adopted.

The advisability of having sectional meetings was discussed but no action was taken.

On a motion by Dr. Gardner seconded by Dr. Poor it was voted that the fee of one dollar pay both the local and state association dues in the Academy.

The nominating committee made the following report:
President, Walter C. Jones, Birmingham-Southern College
First Vice-President, John Y. Graham, University, Ala.
Second Vice-President, O. L. Ayrs, Birmingham, Ala.
Secretary-Treasurer, J. L. Brakefield, Howard College
Councillor A. A. A. S., W. A. Gardner, Auburn, Ala.

Dr. Carmichael moved, and Dr. Gardner seconded, that the report be accepted. The motion carried unanimously.

On motion the Academy adjourned.

The second day's session was called to order by the President at 9:25 A.M., at Phillips High School and was devoted to papers.

Before adjournment a short business session was held.

On a motion by Dr. Duggar it was voted that the Secretary-Treasurer be the temporary custodian of the records of the Academy.

On a motion by Dr. Gardner, seconded by Mr. Causey, it was voted to appoint a committee to investigate the possibility of inviting the A. A. A. S. to hold its annual meeting in Birmingham at any early date. The following committee was appointed: Walter C. Jones, Chairman; Dr. Gardner, Mr. Fertig, and J. L. Brakefield.

The meeting adjourned at 12:30 P.M.

(Signed) J. L. BRAKEFIELD, Secretary-Treasurer.

The Treasurer's Report for the Year Ending March 30, 1928

Receipts

Balance in bank April 9th, 1927.....	\$15.03
A. A. A. S.....	10.50
Membership fees.....	41.00
	<hr/>
Total.....	\$66.53

Disbursements

Stationery	\$18.75
Stamps	10.00
Printing of programs.....	7.50
	<hr/>
Total.....	\$36.25
Balance in bank March 30th, 1928.....	30.28

(Signed) J. L. BRAKEFIELD, Treasurer.

Audited and approved by Franklin Lasseter and Fred Allison.

PAPERS PRESENTED AT THE SIXTH ANNUAL
MEETING OF THE ALABAMA ACADEMY OF
SCIENCE AT BIRMINGHAM, MARCH 22nd
AND 23rd, 1929

Friday Session

"Reality with Reference to the Mind Body Relation,"
D. S. Hill, University of Alabama.

"The Mineral Matter of the Velvet Bean," Emerson R.
Miller, Auburn.

"The Cultivation of the Japanese Peppermint," E. R. Mil-
ler and A. D. Staples, Auburn.

"The Relation of Pre-Medical Education to Medical Edu-
cation," Stuart Graves, University.

"The Musculature and Fascias of the Lower Abdominal
Wall of *Didelphys virginiana*," J. P. Beck, University.

"The Projective Generation of the Skew Cubic Curve in
Three Space," J. C. Nixon, University.

"A New Type of Interferometer," Fred Allison, Auburn.

"The Negative Catalytic Effect of Water," J. R. Sampey,
Howard.

"Microdissection and Manipulation," H. C. Day, Howard.

"The Fecundity of College Graduates," Gladys McCon-
atha, Birmingham-Southern.

"The Marriage of College Graduates," Mary B. Rumsey,
Birmingham-Southern.

"The Effect of the Removal of Appendices in Rabbits,"
Virginia Webb, Birmingham-Southern.

"An Enzyme," W. A. Gardner, Auburn.

"The Solar System Our First Dynamo," Miss Robinson,
Birmingham.

Saturday Session

"The Autolysis of Detached Kidney Tissue in Vivo," Rod-
man Martin, Birmingham-Southern.

"Adsorption of Crystal Faces," T. S. Eckert, Birmingham-
Southern.

"A Comparison of Freshman Grades with Intelligence
Test Scores at Howard College," R. A. Crouch and G. W.
Hess, Howard.

"Some Preventable Biological Causes of Alfalfa Failures
in Alabama," J. F. Duggar, Auburn.

"A New Rapid Method of Staining Specimens of the Hu-
man Central Nervous System for Classes in Neuro Anatomy,"
H. E. Knower, University.

"Studies of the Circulation of Amphibian Embryos by Micro Injection," H. E. Knowler, University.

"A Rare Variation in the Circulation of the Human Lung with Discussion of the Embryological Explanation," W. F. Peacock, University.

"An Unusual Variation in the Human Vena Cava Inferior with Embryological Explanations," Horton Camp, University.

"Demonstration of Sharpening Microtome Knives with the 'Long' Sharpener," Pascal Stone, University.

"Hatchability of the Eggs of the *Limax Flavus* Linnaeus Following Dehydration," T. D. Rivers and E. B. Carmichael, University.

"The Production of Immunity Against Ricin by Treated Ricin," E. B. Carmichael, University.

"The Relation of Pituitary Gland to the Sex Glands and Growth," E. Larson, O. Bergeim, and D. J. Barber, University.

"A Study in Local Parasitology," Septima Smith, University.

"The Occurrence of a Fresh Water Medusa in Stallworth Lake, Tuscaloosa, Ala.," Wm. E. White, University.

**MINUTES OF THE SIXTH ANNUAL MEETING OF
THE ALABAMA ACADEMY OF SCIENCE, HELD
AT PHILLIPS HIGH SCHOOL, IN BIRMING-
HAM, MARCH 22nd AND 23rd, 1929.**

The President of the Academy, Dr. Walter C. Jones, being absent, due to illness, and neither Vice-President being present, the meeting was called to order at 9:00 A.M., March 22nd, by the Secretary, James L. Brakefield. Dr. J. R. Sampey acted as Secretary.

After the reading and discussion of some papers, a business session was held at 10:30 A.M.

The minutes of the 1928 meeting were read and approved.

The committee on inviting the A. A. A. S. to meet in Birmingham reported negatively.

A nominating committee, consisting of J. R. Sampey, D. S. Hill, and J. F. Duggar, was appointed.

Dr. Gardner made a report on the A. A. A. S. meeting in New York at Christmas time in 1928.

It was voted on motion of Dr. Allison that the Academy have an independent session rather than meeting with the Alabama Educational Association.

The Academy accepted an invitation through Dr. Gardner to meet at Auburn in 1930.

Dr. Pruitt of the University explained the new move for a Science Section of the A. E. A., which is intended primarily for high school science teachers.

At the suggestion of the Secretary-Treasurer it was voted to raise the annual dues to two dollars per year.

Dr. Ayrs, the Second Vice-President, came into the room at this time and was asked to take the chair. The Acting Chairman, Dr. Brakefield, resumed his duties as Secretary.

After a lengthy discussion, relative to membership, the chairman appointed a committee, consisting of J. R. Sampey, E. B. Carmichael and W. A. Gardner, to work out a definite scheme of membership to include active and associate members and to recommend the dues for each type of membership.

Further papers were read and discussed and the Academy adjourned at 12:30 P.M.

The Saturday morning session was called to order by First Vice-President J. Y. Graham. Papers were read and discussed until 10:40 A.M., at which time a business session was held.

The Treasurer's report was approved by the auditing committee, Dr. Gardner and Mr. Causey (report appended).

The nominating committee's report was accepted as follows:

Honorary President, John Y. Graham, University, Ala.

President, Fred Allison, Auburn, Ala.

First Vice-President, E. B. Carmichael, University, Ala.

Second Vice-President, T. S. Eckert, Birmingham-Southern.

Secretary-Treasurer, J. L. Brakefield, Howard College.

Councillor A. A. A. S., Wright A. Gardner, Auburn, Ala.

The remaining papers were read and the Academy adjourned at 12:30 P.M.

Report of Treasurer for the Year Ending March 22, 1929

Receipts

Balance in bank March 30th, 1928.....	\$30.28
A. A. A. S.....	14.50
Membership fees.....	65.00
Total.....	<u>\$109.78</u>

Disbursements

Stationery	\$ 7.00
Stamps	9.50
Printing of Programs.....	5.00
Stenographer	8.00
	<hr/>
Total.....	\$29.50
Balance in bank March 22nd, 1929.....	\$80.28

(Signed) J. L. BRAKEFIELD, Treasurer.

Audited and found correct, W. A. Gardner and O. S. Causey.

**PAPERS PRESENTED AT THE SEVENTH ANNUAL
MEETING OF THE ALABAMA ACADEMY OF
SCIENCE, AT AUBURN, APRIL 18th AND 19th,
1930**

Friday Morning, General Session

"A Magneto-Optic Method of Chemical Analysis," Fred Allison and Edgar J. Murphy, Auburn.

"Reflection of Ultra-Violet Light from Various Surfaces," Paul D. Bales, Howard College.

"Lookout Onyx Cave Deposits," Mark D. Cory, Gadsden High School.

"Bauxite in Alabama," Walter B. Jones, University of Alabama.

"The Proposed New Calendar," C. M. Pruitt, University of Alabama.

"Climate of Alabama," Patrick H. Smyth, Montgomery, Ala.

"Some Farm Organization Factors Related to Labor Income on Marshall and DeKalb County Farms, Alabama, 1927 and 1928," C. G. Garman, Auburn.

"Economic Aspects of Improving the Quality of Cotton," J. D. Pope, Auburn.

"Factors Entering into Traction," J. W. Randolph, Auburn.

Friday Afternoon, Biology Section

"The Use of Potash Shale from Cartersville, Ga., as a Source of Potassium for Plants," Harry C. Heath, Womans College, Montgomery.

"Bacillus Coli as an Index of the Proper Pasteurization of Milk," Rebecca Holt, University of Alabama.

"Structure of Plant Chromosomes," Berwin P. Kaufmann, University of Alabama.

"The Transmission of *Bacillus Typhosus* by the Common House Roach," A. Hobson Davis, University of Alabama.

"The Effects of Rattlesnake Venom upon the Number of Blood Corpuscles of the Rabbit," Emmett B. Carmichael, Horton B. Camp and G. C. Stamm, University of Alabama.

"Liver Extract as a Source of Vitamins B. and G.," W. D. Salmon and N. B. Guerrant, Auburn.

"A Pellagra-Like Condition in the Rat," W. D. Salmon and N. B. Guerrant, Auburn.

Friday Afternoon, Chemistry and Mathematics Section

"The Sugar Content of the Berries of *Callicarpa Americana*," Jack P. Montgomery, University of Alabama.

"Inertial Integrals of the Anchor Ring," Mrs. J. C. Nixon, University of Alabama.

"A New Series of Sulfur Dyes," Geo. D. Palmer and S. J. Lloyd, University of Alabama.

"An Arithmetization of One-Argument Functions Possessing Rational Algebraic Addition Theorems," Duncan C. Harkin, Auburn.

"Fuel Briquettes from Southern Pine Sawdust," C. A. Basore, Auburn.

"Halogen Naphthylamines and New Evidence for Intermediate Compound Formation in Hydrogen Ion Catalysis," John R. Sampey, Howard College.

Saturday Morning, Biology Section

"Some Recent Studies of Nodule Formation on Leguminous Plants," J. F. Duggar, Auburn.

"Some Studies on Trematodes," J. H. Walker, University of Alabama.

"An Experimental Study of Henson's Node in the Chick Embryo," Thomas E. Hunt, University of Alabama.

Saturday Morning, Chemistry and Mathematics Section

"Chemical Refining of Graphite," S. J. Lloyd, University of Alabama.

"New Relationships Between Chemical Constitution and Color," Roger W. Allen, Auburn.

"The Value of Mathematical Pastimes in the Classroom," Ralph D. Doner, Auburn.

"Viscosity of Colloidal Solutions," L. D. Bayer, Auburn.

"Elements Essential in Only Small Amounts for Plant Growth," A. L. Sommers, Auburn.

"Methods of Research in Soil Dynamics," M. L. Nichols, Auburn.

MINUTES OF THE SEVENTH ANNUAL MEETING OF
THE ALABAMA ACADEMY OF SCIENCE, HELD
IN THE ROSS CHEMICAL LABORATORY,
AUBURN, ALABAMA, APRIL 18th AND
19th, 1930.

President Fred Allison called the meeting to order at 10 A.M., and introduced Dr. Bradford Knapp, President of Alabama Polytechnic Institute, who welcomed the Academy to Auburn and gave an interesting description of the new Ross Chemical Laboratory and told of the future plans for Auburn.

A committee, consisting of C. H. Hare, E. B. Carmichael, and J. R. Sampey, was appointed to draw up resolutions relative to the deaths of Dr. B. B. Ross and Dr. E. R. Miller.

A series of papers of unusual interest was then presented before the general session.

The report of the committee on resolutions was adopted (report appended).

On motion the meeting adjourned at 12:30 P.M.

The afternoon session convened at 2:00 for a brief business session.

President Allison appointed W. A. Gardner and C. M. Pruitt an auditing committee, which later approved the Treasurer's report (report appended).

Dr. J. L. Brakefield reported for the special committee that it was impracticable to invite the A. A. A. S. meeting to Alabama at this time.

The report of the special committee on membership plans was presented and adopted (report appended).

A nominating committee was appointed, consisting of J. R. Sampey, E. B. Carmichael, and B. A. Wooten.

On a motion by Dr. Wooten, seconded by Dr. Duggar, the Academy voted to publish at least one number of "Abstracts and Proceedings" each year.

Dr. Gardner moved and Dr. Sampey seconded that the Editor be elected in the usual manner. The motion carried.

J. L. Brakefield, Franklin Lasseter, and J. F. Duggar were appointed to plan Sections of the Academy.

On a motion by J. L. Brakefield, seconded by B. A. Wooten, the Academy adopted the policy of a Presidential Address at the annual meeting.

The invitation through Dr. Carmichael to meet at the University in 1931 was unanimously accepted.

The report of the nominating committee was adopted as follows:

President, Emmett B. Carmichael, University, Ala.

First Vice-President, George Fertig, Birmingham, Ala.

Second Vice-President, Herbert Martin, Auburn, Ala.
 Secretary-Treasurer, J. L. Brakefield, Howard College.
 Editor of Journal, Ernest V. Jones, Birmingham-Southern

College.

Councillor A. A. A. S., Wright A. Gardner, Auburn, Ala.

The Academy at this time divided into two sections, namely, Biology, with Dr. Carmichael as chairman, and Chemistry and Mathematics, with Dr. Allison in the chair, for simultaneous papers before these sections.

At 7:00 P.M., a banquet was held in Smith Hall and the annual address was given by President Bradford Knapp, his subject being "Science and the South." Adjournment came at 10:30 P.M.

The Saturday session was called to order by President Allison at 9 A.M.

Doctors H. C. Heath, T. S. Eckert, and J. R. Sampey were appointed as a committee to draw up resolutions on the Seventh Annual Meeting of the Academy (report appended). A copy of this report was sent by the Secretary to President Bradford Knapp.

The Academy then went into session in two sections for the discussion of special papers.

The seventh annual meeting of the Academy adjourned at 12:30 P.M.

(Signed) J. L. BRAKEFIELD, Secretary.

Report of Treasurer for the Year Ending April 16, 1930

Receipts

Balance in Woodlawn Bank, March 22nd, 1929.....	\$ 80.28
A. A. A. S. and Membership fees, May 3, 1929.....	15.50
Total.....	<u>\$ 95.78</u>

Disbursements

Stationery	\$ 12.25
Stamps	3.00
Total.....	<u>\$ 15.25</u>
Balance when Bank closed July 6th, 1929.....	\$ 80.53

Present account with Wahouma Bank, East Lake.

Receipts

A. A. A. S. and Membership fees	<u>\$148.50</u>
---------------------------------------	-----------------

Disbursements

Stamps	\$ 8.00
Printing of Programs	6.50
Stenographer	5.00
Checks returned	6.00
Total	\$ 25.50
Balance in bank April 16th, 1930	\$123.00

(Signed) J. L. BRAKEFIELD, Treasurer.

Audited and approved by C. M. Pruitt and W. A. Gardner.

CONSTITUTION OF THE ALABAMA ACADEMY OF SCIENCE—1924

ARTICLE 1.—*Name.* This organization shall be known as the Alabama Academy of Science.

ARTICLE 2.—*Purpose.* The purpose of this society shall be the study and the advancement of science.

ARTICLE 3.—*Membership and Dues.* Membership shall be open to any one vitally interested in science (1) who is recommended by two members and is approved by the executive board or (2) who is recommended by two members and is elected by a majority of four-fifths of the members present at any open meeting. Voting shall be by ballot. Dues (1) shall be one dollar (\$1.00) per year. Charter members shall consist of those who shall pay their dues within sixty days after the meeting held to organize this society; attendance at this meeting shall not be a requisite.

ARTICLE 4.—*Officers* (2). The officers of this association shall be a president, first vice-president, second vice-president, and secretary-treasurer. These officers together with the retiring president shall constitute the executive committee. No one shall be eligible to office who is in arrears in the payment of his or her dues. The duties of these officers shall be those usually devolving upon such officers in formal organizations. The tenure of office shall be for one year or until successors shall be elected, except in the case of the retiring president who shall automatically become a member of the executive board for the succeeding year.

ARTICLE 5. An annual meeting shall be held at such time and place as the executive board shall determine.

ARTICLE 6. All disbursements made by the secretary-treasurer or by any other officer or member shall be approved by the president.

ARTICLE 7. This constitution may be amended at any annual meeting by a three-fourths vote of the members present. A quorum shall consist of twenty-five per cent of the membership.

(1)—Dues were raised to two dollars per year in 1929.

(2)—Editor of Journal was added to the list of officers in 1930.

REPORT OF THE COMMITTEE ON MEMBERSHIP OF THE ALABAMA ACADEMY OF SCIENCE

Mr. President :

The Committee on Membership of the Alabama Academy of Science desires to submit the following report :

I. We recommend that the Academy recognize the following grades of membership—

1. *Honorary Members.* Members of the Academy who have had some national honor conferred upon them shall be eligible for Honorary Membership.

2. *Life Members.* Any Honorary Member, Fellow or Member of the Academy may become a Life Member by paying into the Treasury the sum of fifty dollars.

3. *Fellows.* Members of the Academy who are Fellows of the American Association for the Advancement of Science shall be classed as Fellows of the Academy.

4. *Members.* Membership in the Academy shall be open to any man or woman in the State of Alabama who is actively engaged in science, either pure or applied, and who has received a four year collegiate degree, or who has had a minimum of ten years professional experience. Two years may be deducted from this minimum of ten years for each year the individual spent in college.

5. *Associate Members.* Any individual interested in the promotion of science in Alabama shall be eligible for Associate Membership.

II. The fees for the several grades of membership shall be as follows :

1. Life members: fifty dollars.

2. Honorary Members, Fellows and Members: two dollars.

3. Associate Members: one dollar.

4. Any individual holding more than one grade of membership shall be assessed only one fee.

III. The President of the Academy shall appoint a Membership Committee to be composed of three members. It shall be the duty of this Committee to examine the qualifications of the candidates, and to recommend to the Academy the names of those eligible for each grade of membership. The Secretary of the Academy shall be the Chairman of the Membership Committee.

EMMETT B. CARMICHAEL,
WRIGHT A. GARDNER,
JOHN R. SAMPEY, Chairman.

REPORT OF RESOLUTIONS COMMITTEE

Mr. President and Gentlemen of the Alabama Academy of Science:

It is a melancholy occasion which brings us together in this building which is a monument to a distinguished scientist and lovable gentleman.

All of us have known him to admire his high attainments—many of us have known him intimately and personally, to hold for him a continuing affection.

It would have pleased him much, and who can say that he is not now pleased, that the first practical use to be made of the structure that bears his name is to bring under its roof a gathering of the friends and scientists of his own state.

It is by no means the purpose of this meeting to eulogize Dr. Ross, but we are gathered here at this time merely to offer our silent tribute to those qualities of manhood which endeared him to all, and to those scientific gifts which placed him in the ranks of the foremost chemists of the land.

Another member of this Academy who has passed on to the Great Beyond is Dr. Emerson R. Miller who, from the organization of this body, was earnest in his efforts to promote its usefulness. He was an indefatigable worker in chemistry, being one of the most eminent men in the field of Pure Science in the South.

It is the purpose of the Alabama Polytechnic Institute to recognize him, in a feeble way, by calling the Library Room in this building The Emerson R. Miller Chemical Library.

Your committee proposes that we stand silently for a moment in token of respect for our departed friends and co-workers.

E. B. CARMICHAEL,
J. R. SAMPEY,
C. L. HARE, Chairman,
Committee on Resolutions.

**REPORT OF THE RESOLUTIONS COMMITTEE OF
THE SEVENTH ANNUAL MEETING OF THE
ALABAMA ACADEMY OF SCIENCE**

Whereas the Alabama Academy of Science has just held its seventh Annual Meeting in the Ross Chemical Laboratory of the Alabama Polytechnic Institute,

And whereas it was the unanimous opinion of the Members of the Academy who were guests in Auburn that the success of the Meeting was due to the carefully laid, and well executed, plans of the Administration and Faculty of the Alabama Polytechnic Institute who are Members of the Academy,

It was resolved by a motion duly made, seconded, and passed at the closing Session of the Seventh Annual Meeting that a Resolutions Committee express to the Auburn Members appreciation for the generous hospitality extended to the Academy as a whole, and for the numerous courtesies shown individual Members.

It was resolved further that one copy of these Resolutions be forwarded to President Bradford Knapp, and that a second copy be spread upon the Minutes of the Academy.

HARRY C. HEATH,
T. S. ECKERT,
JOHN R. SAMPEY, Chairman.

..... THE NEW YORK ACADEMY OF SCIENCES
77th Street & Central Park West
NEW YORK, N. Y.

THE JOURNAL

of the

ALABAMA ACADEMY
OF SCIENCE

For 1932

VOLUME III

PROCEEDINGS

of

THE EIGHTH ANNUAL MEETING

UNIVERSITY, 1931

Office of the Editor

BIRMINGHAM-SOUTHERN COLLEGE

Birmingham, Alabama

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Birmingham, Alabama

ALABAMA ACADEMY OF SCIENCE

Officers of the Academy

1931-1932

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1930-1931

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WALTER C. JONES.....	Birmingham.....	1928-1929
FRED ALLISON.....	Auburn.....	1929-1930
EMMETT B. CARMICHAEL.....	University.....	1930-1931

Membership Committee

WALTER C. JONES
JAMES L. BRAKEFIELD, *Chairman*

W. P. OTT

MEMBERS OF THE ALABAMA ACADEMY OF SCIENCE

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Allen, B. E.	University, Ala.
Allen, R. W.	A. P. I., Auburn, Ala.
Allison, Fred	A. P. I., Auburn, Ala.
Arnquist, W. N.	Auburn, Ala.
Ayrs, Orla L.	1001 Crescent Ave., Birmingham, Ala.
Bales, P. D.	7900 7th Ave., S., Birmingham, Ala.
Barksdale, Jelks	University, Ala.
Basore, C. A.	A. P. I., Auburn, Ala.
Bell, Leslie M.	Harvard Medical, Boston, Mass.
Benham, A. S.	800 S. 20th St., Birmingham, Ala.
Blair, A. W.	1427 Univ. Ave., Tuscaloosa, Ala.
Bologna, Angelo	Washington Univ., St. Louis, Mo.
Brakefield, J. L.	Howard College, Birmingham, Ala.
Breckenridge, C. G.	Box 1835, University, Ala.
Brooks, Clyde	University, Ala.
Bunker, P. S.	500 Dexter Ave., Montgomery, Ala.
Burke, Mary K. (Miss)	Manly Hall, University, Ala.
Burn, Harry	1410 S. 16th Ave., Birmingham, Ala.
Burns, M. P.	200 Owen Ave., Bessemer, Ala.
Callaway, J. L.	Duke University, Durham, N. C.
Camp, Horton	Mumford, Ala.
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Clark, B. G.	University of Illinois, Urbana, Ill.
Coe, G. D.	513 12th Ave., Tuscaloosa, Ala.
Cohen, Louis	University, Ala.
Colley, James O.	University, Ala.
Conwell, H. E.	T. C. I. Hospital, Fairfield, Ala.
Cory, M. D.	Box 337, Gadsden, Ala.
Cudworth, J. R.	University, Ala.
Dahlene, Oscar	University, Ala.
Davis, A. H.	Boston, Mass.
Davis, S. D.	University, Ala.
Doner, R. D.	Auburn, Ala.
Duggar, J. F.	Auburn, Ala.
Duggar, J. F., Jr.	Hope Hall, University, Ala.
Eberhardt, Margaret (Miss)	Phillips H. School, Birmingham, Ala.
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Evans, R. E.	Massilon, Ohio

Farmer, C. M.	275 Brundidge, Troy, Ala.
Farabee, R. L.	University, Ala.
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Foley, J. O.	Department of Anatomy, University, Ala.
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Hodges, Robert S.	University, Ala.
Holt, Rebecca A. (Miss)	New Orleans, La.
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Hunt, T. E. (Mrs.)	Box 1594, University, Ala.
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Jackson, L. P.	Tuscaloosa, Ala.
Jones, E. V.	Birmingham-Southern College, Birmingham, Ala.
Jones, H. D.	Auburn, Ala.
Jones, W. B.	University, Ala.
Jones, W. C.	T. C. I. Hospital, Birmingham, Ala.
Kaufman, P.	University, Ala.
Keinigsberg, Aaron	Rush Medical, Chicago, Ill.
Kennedy, J. J.	University, Ala.
Kille, F. R., Birmingham-Southern College,	Birmingham, Ala.
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Knapp, Bradford	A. P. I., Auburn, Ala.
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Lewis, F. A.	University, Ala.
Lloyd, S. J.	University, Ala.
Mabrey, G. S.	Horton, Ala.

- McBurney, Ralph.....1519 13th St., Tuscaloosa, Ala.
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 McVay, T. N.University, Ala.
 Martin, H. M.A. P. I., Auburn, Ala.
 Montgomery, J. P.University, Ala.
 Moore, E. G.St. Health Dept., Montgomery, Ala.
 Moore, W. A.
Birmingham-Southern College, Birmingham, Ala.
 Moss, E. S.University, Ala.
 Naftel, L. S.Auburn, Ala.
 Oberdoerfer, Benedict...St. Bernard College, St. Bernard, Ala.
 Ott, W. P.University, Ala.
 Palmer, G. D.1001 University Ave., Tuscaloosa, Ala.
 Payne, W. G.University, Ala.
 Pinkston, J. O.Harvard Medical, Boston, Mass.
 Pirenian, Z. N.A. P. I., Auburn, Ala.
 Poor, R. S. Birmingham-Southern College, Birmingham, Ala.
 Powell, P. P.Auburn, Ala.
 Pruitt, C. M.Ross Apts., Tuscaloosa, Ala.
 Ragsdale, L. V.Realty Bldg., Bessemer, Ala.
 Reinke, E. E.Vanderbilt University, Nashville, Tenn.
 Robinson, J. M.Auburn, Ala.
 Robinson, Mary E. (Miss).....
430 Princeton Ave., Birmingham, Ala.
 Sampey, John R.Howard College, Birmingham, Ala.
 Sellmann, A. H.University, Ala.
 Sell, WilliamUniversity, Ala.
 Shirley, KatherineUniversity, Ala.
 Smith, J. W.222 S. Lawrence St., Montgomery, Ala.
 Smith, Septima711 Queen City Ave., Tuscaloosa, Ala.
 Smyth, P. H.Weather Bureau, Montgomery, Ala.
 Spieth, A. M. (Miss)Livingston, Ala.
 Stabler, A. C.University, Ala.
 Stone, P. T.
Woman's College of Alabama, Montgomery, Ala.
 Swann, Theodore 930 Brown-Marx Bldg., Birmingham, Ala.
 Towery, Thera Mae (Miss).....
Howard College, Birmingham, Ala.
 VanAller, T. S.902 Charleston St., Mobile, Ala.
 Veal, J. R.Boston, Mass.
 Walker, J. H.University, Ala.
 Walker, Catherine (Mrs.)University, Ala.
 Wallace, Roberta T. (Mrs.).....
1512 S. 33rd St., Birmingham, Ala.
 Watt, LucilleTuscaloosa, Ala.
 Weatherford, W. J.516 13th Ave., Tuscaloosa, Ala.

Webb, Virginia E. (Miss)	Calvert, Ala.
Whiting, W. A.	Birmingham-Southern College, Birmingham, Ala.
Whitehurst, W. L.	Sheffield, Ala.
Wilmore, J. J.	Auburn, Ala.
Williams, S. J.	Tuscaloosa, Ala.
Wilson, Arnold	R. F. D. 1, Quinton, Ala.
Wing, Herbert	Howard College, Birmingham, Ala.
Wooten, B. A.	University, Ala.
Xan, John	Howard College, Birmingham, Ala.

*THE ORGANIZATION OF THE ALABAMA ACADEMY OF SCIENCE

It appears that the record of the first move in the organization of the Alabama Academy of Science has been lost. This consisted of letters to the heads of the higher institutions in Alabama and to some of the instructors in science. The first reply to these letters came July 2, 1923, from President Guy E. Snavely of Birmingham-Southern. He wrote: "I should think an Alabama academy of science would be an excellent thing."

July 6, Dr. S. A. Ives of Howard College wrote: "I shall be glad to cooperate with you in any plan for advancing the scientific interest in Alabama."

July 12, Dr. W. A. Whiting of Birmingham-Southern College wrote: "I believe it is desirable to organize an Alabama academy of science. I pledge my aid and support in its organization." The next day a letter came from Dr. Fred Allison of the Alabama Polytechnic Institute saying: "I wish to register my interest in any such movement. . . . I wish you all good success."

A few days later, indeed August 3, Dr. Walter C. Jones of Birmingham-Southern wrote: "I think it a very good idea and am very much inclined to help in carrying it out. There is no doubt in my mind that we could form a very strong and useful society."

Four days later Dr. J. Y. Graham at the University of Alabama wrote: "I quite agree that the organization of an academy of science in Alabama is very desirable."

August 20 of the same year, Miss Arah H. Hubbard of Judson College wrote: "It is highly desirable to have an Alabama academy of science as a medium of contact and exchange of ideas. I have long felt the need of such an organization."

With these assurances the writer allowed the matter to rest until early in January, 1924, when H. G. Dowling, Secretary-Treasurer of the Alabama Educational Association, wrote that he was quite willing to publish in the Alabama School Journal the program of the proposed academy. With the assurance that the academy would be recognized by the Alabama Educational Association, the following letter was mailed January 9 to the scientists in the higher institutions of learning, as well as to a number of science teachers in the high schools of Alabama:

*This account of the organization of the Academy was written at the request of the Editor of the Journal by Wright A. Gardner of Auburn. Dr. Gardner is too modest to claim the honor which is due him. We might almost say he was the founder of the Alabama Academy of Science.—Editor.

"Dear Sir:

"A number of teachers and other workers in scientific subjects have expressed a desire to organize an Alabama Academy of Science. It seems that the best time for the organization meeting is at the time of the meeting of the Alabama Educational Association in Montgomery, April 3-5. We have had a very friendly and cordial letter from the Secretary, H. G. Dowling, assuring us of cooperation and recognition as a section of the A. E. A. as soon as request is formally made.

"He states that programs are nearly completed and that ours should be submitted at an early date. Please send the title of a paper to be presented by you before the proposed Science Section. Reports of progress in research or interesting observations will be acceptable.

"May we count on you to spread the good news and to persuade your scientific friends to take part in the initial program?

"Trusting that I may hear from you at an early date, I am,

"Very truly yours,

"WRIGHT A. GARDNER,

"Acting Secretary."

January 11, 1924, Dean Clyde Brooks of the School of Medicine at the University wrote that he was glad to hear of the organization and that he would be glad to help.

The next day Dr. Eugene A. Smith, State Geologist, wrote: "This movement I approve heartily. I shall be writing again very soon, giving you a list of our faculty members who would like to take part in the organization of the proposed academy.

"I think you will probably be interested in the record of a somewhat similar organization founded January, 1891, viz.: The Alabama Industrial and Scientific Society, of which I have had Vols. I-IX bound and a copy forwarded you by this mail. This society was discontinued for the reason that only a very small number could ever be counted on for attending the meetings. We first had meetings in different cities of the State, but finally came down to having all the meetings in Birmingham, since most of the members lived there. Dr. B. B. Ross was a member and can tell you something about that society. At one time we thought of calling it the 'Alabama Academy of Science,' but that seemed to be too ambitious, and we finally fell back on the industrial and scientific problems illustrated in the Birmingham district."

January 13, 1924, Dr. S. J. Lloyd wrote that he would be

glad indeed to participate in the organization of an academy of science for Alabama and submitted a title.

January 14, 1924, Dr. C. A. Basore submitted for the title of his paper, "Low Temperature Precipitation."

January 14, 1924, Mr. E. C. Sechreist wrote: "I think the plan a splendid one."

The following is a partial list* of the charter members of the academy:

Allison, Fred	Jones, Walter C.
Ayrs, O. L.	Lloyd, Stewart J.
Basore, C. A.	Loding, H. P.
Brannon, Peter A.	Oppitz, L. K.
Brooks, Clyde	Pallister, H. D.
Bunker, P. S.	Saunders, P. C.
Farmer, C. M.	Sechreist, E. C.
Graham, J. Y.	Smith, Eugene A.
Guyton, F. E.	Smyth, P. H.
Hubbard, A. H.	Whiting, W. A.
Ives, S. A.	

The first meeting of the Alabama Academy of Science met (as the Science Section of the Alabama Educational Association) at the Sidney Lanier High School in Montgomery, Ala., April 3-5, 1924. The program of the first meetings:

ALABAMA ACADEMY OF SCIENCE

(Science Section of the Alabama Educational Association)

April 3-5, 1924

Sidney Lanier High School, Montgomery, Ala.

1. Temporary Organization.
2. "Abnormal Deviations of the Spine," Charles K. Zeilman, Department of Physics, Birmingham-Southern College.
3. "Low Temperature Precipitation," C. A. Basore, Department of Chemistry, Alabama Polytechnic Institute.
4. "History of the Alabama Industrial and Scientific Society," Eugene A. Smith, Geological Survey of Alabama.
5. "Electrolytic Calcium Arsenate," Stewart J. Lloyd, Department of Chemical Engineering, University of Alabama.
6. "Human Leukocytes as Indices of Resistance to Disease," Walter C. Jones, Zoology Department, Birmingham-Southern College.

*There must have been about forty charter members. The Editor will be glad to receive notice of others who joined the Academy before June 4th, "the day agreed on to close the charter membership roll."

7. Appointment of Committees.
8. "Recent Work on Control of Bean Beetle or Cabbage Webworm," F. L. Thomas, Department of Entomology, Alabama Polytechnic Institute.
9. "Recent Work on Control of the Mexican Cotton Boll Weevil," W. E. Hinds, Department of Entomology, Alabama Polytechnic Institute.
10. "Dairy Bacteriology," W. A. Whiting, Department of Biology, Birmingham-Southern College.
11. "The Work of the State Mine Experiment Station and Its Relation to the Industries," H. D. Pallister, Director of the School of Mines, University of Alabama.
12. "Some Effects Resulting From Eating Velvet Beans," Emerson R. Miller, O. N. Massengale and M. A. Barnes.
13. "Velvet Beans as a Ration for Brood Sows," Emerson R. Miller and W. D. Salmon.
14. "Some Unusual Variations in the Weight of Internal Organs of Hogs," Emerson R. Miller and O. N. Massengale.
15. "The Chemical Composition of Acorns," Emerson R. Miller and S. J. Marion.
16. "The Mineral Deficiencies of the Velvet Bean," Emerson R. Miller and G. L. Burleson.
17. "An Alabama Plant of Interest in the Production of Volatile Oil," Emerson R. Miller.

Second Session

1. "The Eye as the Window to the Mind," E. C. Sechreist, Department of Natural Science, Ensley High School.
2. "Beetles," H. P. Loding, Mobile, Ala.
3. "Contagious Abortion," R. S. Sugg, Bacteriologist, Alabama Polytechnic Institute.
4. "Distribution of and Damage Done by the Wood-Destroying Fungus, *Poria incrassata*, in Alabama," L. E. Miles, Plant Pathologist, Alabama Polytechnic Institute.
6. Invitation Papers.
7. Reports of Committees.
8. Election of Officers.
9. "Ecological Summary of the Flora of a Portion of the Birmingham District," Dr. S. A. Ives, Dean of the School of Science, Howard College.
10. "The Manufacture of Ozone and the Energy Relation in Ozone Formation," Dr. P. C. Saunders, Acting Head of Department of Chemistry, Howard College.
11. "Bird Migration," Prof. J. M. Robinson, Zoology Department, Alabama Polytechnic Institute.

12. "Climatic Features of Alabama," P. H. Smyth, Meteorologist of Alabama, Montgomery, Ala.
13. "Air Drainage in Alabama," P. H. Smith, Meteorologist of Alabama, Montgomery, Ala.
14. "Agarics of Alabama," Dr. R. P. Burke, Specialist, Montgomery, Ala.

Besides the program as given above there should be mentioned the luncheon held Friday noon, April 4, at the Gay-Teague Hotel, which was attended by about 20 very enthusiastic Alabama scientists. This luncheon gave an opportunity for scientists of the different institutions to become better acquainted and to express their enthusiasm and anticipation for the formal organization of the Alabama Academy of Science. At the luncheon were represented not only the University, Alabama Polytechnic Institute, Howard College, Birmingham-Southern College, and the other colleges of the State, but also the high schools, normal schools and academies of the State.

It is the opinion of the writer that the pleasant contacts made during the luncheon had as much to do with the early success of the Alabama Academy of Science as the interesting programs presented above.

At the time of temporary organization in the first program, certain committees were appointed, including one on constitution and one on nominations. The reports of the committees were presented at the close of the Friday session and the following officers elected:

President, W. A. Gardner, A. P. I.

First Vice-President, H. D. Pallister, University of Alabama.

Second Vice-President, Walter C. Jones, Birmingham-Southern.

Secretary-Treasurer, Summer A. Ives, Howard College.

May 19, 1924, Secretary-Treasurer S. A. Ives wrote: "There are 36 who have already paid the dues and I know of several more who will join before the fourth of June, the day agreed on to close the charter membership roll."

PAPERS PRESENTED AT THE EIGHTH ANNUAL
MEETING OF THE ALABAMA ACADEMY OF
SCIENCE AT THE UNIVERSITY OF ALA-
BAMA, MARCH 13TH AND 14TH, 1931

Friday Morning—Biology Section

J. F. Duggar, Chairman

"Amphimerus alabamiensis—A New Species of Trematode Found in the Alabama Turtle," J. H. Walker, Jr., University.

"A Study of Telorchis sp. Found in the Alabama Turtle," C. G. Breckenridge, University.

"A Cytological Method for Staining with the Ehrlich-Biondi Mixture," James O. Foley, University.

"On the Cytological Processes Involved in the Formation of the Peri-Lymph Spaces of the Inner Ear," James O. Foley, University.

"Black Resistance in Sweet Potatoes," W. A. Gardner, Auburn.

"The Development of Chick Limb Buds in Chorio-Allantoic Grafts," Eleanor A. Hunt, University.

Friday Morning—Chemistry and Mathematics Section

C. D. Killebrew, Chairman

"Reactions of Organic Compounds with Molten Elements," G. D. Palmer, University.

"Isolation and Study of the Saponin Content of the Juice and Leaf of the Agave Plant, Maguey Manso Fino," H. D. Jones, assisted by G. N. Furbech and Rual Colorado, University.

"Analysis of Numerical Data," William Sell, University.

"Homology and Periodicity in Fused Ring Compounds," Jack P. Montgomery, University.

"The Relation of Specific Gravity of Molai Aqueous Solutions to the Ionization Constant of the Solute," Jack P. Montgomery, University.

Friday Afternoon—Biology Section

Wright A. Gardner, Chairman

"Chromosome Structure in Drosophila," B. P. Kaufman, University.

"Fresh Water Protozoa of the Tuscaloosa District," Thera Mae Towery, Howard College.

"Methods in the Studying the Life History of Diabrotica," J. M. Robinson, Auburn.

"A Functional Study of the Mesonephros in Chick Embryos," E. A. Boyden, Tuscaloosa.

"Some Means of Increasing the Beneficial Root Nodules on the Peanut Plant," J. F. Duggar, Auburn.

Friday Afternoon—Chemistry and Mathematics Section

Fred Allison, Chairman

"Method of Determining Response of Various Shaped Antennae to Fundamental and Harmonic Waves," P. D. Bales, Howard College.

"Types of Different Equations Invariant under Certain One-Parameter Groups," William F. Adams, University.

A Problem Involving the Determination of the Orbit of One Binary Star Around Another Having Given the Law of Force, Sarah Ella Haughton.

"A Property of Anharmonic Curve," J. D. Mancill, University.

"The Rearrangement of Asymmetric Hydrazones of Hydrazine Hydrate," J. Xan, Howard College.

Saturday Morning—Biology Section

John Y. Graham, Chairman

"Note on the Structure and Occurrence of the Perichete Genus *Phaeritima* in the Neighborhood of University, Alabama," Martle Fay Parker, University.

"Monocystis in *Phaeritima*," Septima Smith, University.

"A Report of the Studies of Doerr, Stahelin, and Others Concerning the Mechanism of *Trichinella* Infection," John Y. Graham, University.

"The Potencies of the Chick Blastoderm with Special Reference to Hensen's Node as Shown by Chorio-Allantoic Grafts," T. E. Hunt, University.

"Note on Sarcocystis in Pork Associated with Enteric Disturbances," Septima Smith, University.

"Note on the Structure of the Zellenkorper of *Trichinella Spiralis* (Owen, 1835), Railliet, 1895," John Y. Graham, University.

Saturday Morning—Chemistry and Mathematics Section

Herbert Martin, Chairman

"Some Recent Results of the Magneto-Optic Method of Analysis," Fred Allison, Auburn.

"The Potential Field of an Atom as Determined from

Measurements of the Scattering of Alpha Particles or Electrons," W. N. Arnquist.

"Crystal Absorptions," T. S. Eckert, Birmingham-Southern College.

Saturday Morning—Industrial Section

George Fertig, Chairman

"The Status of Coal Preparation in the Birmingham District," Mr. B. W. Gandrud, Bureau of Mines, Tuscaloosa.

"Low Temperature Carbonization of Coal," Mr. J. L. Ballard, Jr., University of Alabama.

"The Microscope in Foundry Work," Mr. E. K. Smith, Metallurgist, Stockham Pipe & Fittings Company.

"Syntheses of Several Ayril Disulphides of Interest to the Dye Chemist," Dr. Roger Allen, Alabama Polytechnic Institute.

"A Problem in Ceramics," Dr. T. N. McVay, Department of Ceramics, University of Alabama.

*"A Problem in Varnish Manufacture," Mr. William Stevenson, Benson Paint & Varnish Company.

"Some Micro-Chemical Tests," Mr. C. S. Whittet, Chief Chemist, McWane Cast Iron Pipe Company.

*"Puzzolan Cements," Mr. J. W. Miner, Birmingham-Southern College.

"Cold Pigs and Hot Metal Charges in the Open Hearth Furnace," Mr. E. A. Hawk, Fuel Engineer, Tennessee Coal, Iron & Railroad Company.

"A High Grade Decolorizing Carbon from Extracted Cotton Seed Hulls," Dr. C. A. Basore, Alabama Polytechnic Institute.

"The Reactivity of Coke," W. M. Mobley, Alabama By-Products Company.

*"Fuel and Refractory Relationship in the Open Hearth Furnace," Mr. M. P. Burns, Assistant Fuel Engineer, Tennessee Coal, Iron & Railroad Company.

*"Transportation of Powdered Coal," Dr. Stewart J. Lloyd, University of Alabama.

*"Malleable Castings in the South," Mr. E. K. Smith, Metallurgist, Stockham Pipe & Fittings Company.

*"Heat Calculations in Charges of the Open Hearth Furnace," Mr. E. A. Hawk, Fuel Engineer, Tennessee Coal, Iron & Railroad Company.

*"Commercial Extraction of Radium," Mr. H. D. Harrison, University of Alabama.

*For lack of time these papers were presented by title only.

MINUTES OF THE EIGHTH ANNUAL MEETING OF
THE ALABAMA ACADEMY OF SCIENCE HELD
IN NOTT HALL AT THE UNIVERSITY OF
ALABAMA, MARCH 13TH AND 14TH, 1931

The meeting was called to order at 10 a. m., March 13th, by Emmett B. Carmichael, President of the Academy.

The Academy was welcomed by President George H. Denny on behalf of the University and by Mr. E. B. Verner, President of the Chamber of Commerce, on behalf of the citizens of Tuscaloosa. Dr. J. L. Brakefield responded to these addresses.

The Academy immediately convened in sections for the papers of the morning programs.

The Academy convened at 2 p. m. for a business session, with President Carmichael presiding. Secretary Brakefield read the minutes of the Seventh Annual Meeting, which were approved.

Dr. J. L. Brakefield reported for the special committee that it seemed inadvisable to invite the A. A. A. S. to meet soon in Alabama. The President then appointed George Fertig and S. J. Lloyd as a committee to look further into the matter of inviting the A. A. A. S. to meet in Alabama.

The Secretary reported three sections of the Academy, namely, Biology, Chemistry and Mathematics, and Industrial Sections, and stated that other sections would probably be formed during the following year.

Dr. E. V. Jones reported that a number of the Journal had been published and was ready for distribution. He suggested that the new President appoint a committee to work with him in the selection of papers to be published in the Journal.

President Carmichael appointed the following committees: nominating committee, S. J. Lloyd, J. F. Duggar, O. S. Causey, E. V. Jones, H. C. Heath; resolutions committee, E. V. Jones, Fred Allison, C. M. Farmer; auditing committee, Roger Allen, B. P. Kaufman.

Letters of invitation to the Academy to meet at Howard College in 1932 were read by President Carmichael and the invitation was accepted.

On a motion by Mr. Sell, seconded by Mr. Brooks, it was voted to have two offices, namely, secretary and treasurer, rather than the one office, secretary-treasurer.

The Academy authorized the Secretary to arrange the program for the next annual meeting.

After a picture in front of Nott Hall the Academy convened in sections for the papers of the afternoon.

Many members of the Academy went through the Libby, McNeill and Libby Condensery at 4 p. m., while the ladies were having tea in the Nott Hall Library.

At 7 p. m., more than one hundred members and their guests enjoyed a banquet in the Alabama Union, followed by an address on "The South's Contribution to Science" by President Emmett B. Carmichael. A reception was then held in the parlors of the Alabama Union.

The Academy was called to order at 9 a. m., March 14th, by President Carmichael for a business session. The following committee reports were read and adopted on motion: nominating committee, auditing committee, resolutions committee. The reports are appended.

On motion by Dr. Allison, Dr. Reinke of Vanderbilt University, was elected to honorary membership in the Academy.

On a motion by Dr. Duggar it was voted to draw up resolutions relative to the death of Dr. H. B. Battle.

On a motion by Dr. E. V. Jones it was voted to appoint a publication committee.

It was voted to appoint a committee to design a "shingle" and have a supply printed.

Following the business session Dr. Kaufman introduced Dr. E. E. Reinke of Vanderbilt University, who addressed the Academy on "The Proposed Highlands (N. C.) Museum and Biological Research Laboratory for the South."

Dean Graves of the Medical School of the University of Alabama then spoke briefly on "The New Aptitude Tests for Pre-Medics."

With expressions of appreciation of the fine meeting and with hopes for an even bigger and better meeting at Howard College in 1932, the Academy convened in sections—a large number attending the new industrial section—for the papers of the morning programs, at the close of which the eighth annual meeting stood adjourned.

(Signed) J. L. BRAKEFIELD, Secretary.

REPORT OF THE NOMINATING COMMITTEE

President—George Fertig, Pittsburgh Testing Laboratory, 1700 2nd Ave., N., Birmingham.

First Vice-President—Herbert Martin, Auburn, Ala.

Second Vice-President—H. C. Heath, Woman's College, Montgomery, Ala.

Secretary—J. L. Brakefield, Howard College, Birmingham, Ala.

Treasurer—E. A. Hawk, T. C. I., Ensley, Ala.

Editor of Journal—E. V. Jones, Birmingham-Southern College, Birmingham, Ala.

Councillor to A. A. A. S.—E. B. Carmichael, University, Ala.

Report of the Treasurer for the Year Ending March 11, 1931

Receipts

Balance in the Wahouma Savings Bank Bank April 16, 1930.....	\$ 123.00
Membership fees.....	173.00
A. A. A. S.....	18.00
Total	\$ 314.00

Disbursements

Stationery	\$ 19.25
Stamps	16.50
Telephone call.....	2.00
Stenographer	6.00
Total	\$ 43.75
Checks returned (insufficient funds).....	7.00
Total (disbursements and returned checks)	\$ 50.75

Balance in Woodlawn American National Bank* March 11, 1931 (receipts, less total disbursements and returned checks).....	\$ 263.25
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Liabilities

Checks to Birmingham Printing Company for Pro-grams	\$ 18.00
Bill to Birmingham Printing Company for Bulletin.....	76.80
Total	\$ 94.80

Other Assets

Academy is due approximately \$20.00 in fees from A. A. A. S.
Approved:

ROGER W. ALLEN, Chairman

B. P. KAUFMAN

(Signed) J. L. BRAKEFIELD, Sec.-Treas.

*Wahouma Savings Bank combined with the Woodlawn National Bank.

REPORT OF THE EDITOR

Notice of my election as Editor of the Journal reached me about the middle of October. Having been absent from the Auburn meeting of the Academy, I was wholly uninformed as to the duties of my office. In the midst of a heavy schedule of work I laid the notice aside expecting, with the help of the Secretary, to take up the duties of my office during the Christmas holidays. But the Secretary beat me to the vacation a couple of days and was out of the city when I called him. So the work went over into the new year. Then to my consternation I learned that, though both the President and Secretary were very willing to help me, neither of them had a very clear idea of what I was to do. From the minutes it appeared that the Academy had voted "to publish at least one number of 'Abstracts and Proceedings' each year and then had elected an editor of the Journal. Since time did not permit me to secure abstracts of the papers presented before the Academy in recent years, I decided, after conference and correspondence with the above named officers, to publish only the minutes and programs of the meetings of the Academy since the "Abstracts" were published in 1926 and to call this issue Volume II of the Journal of the Alabama Academy of Science for 1930.

The earlier minutes have not been published and were not included in this issue because they could not be found. If anyone can locate these records he will render a real service to the Academy.

A belated effort was made by the editor to get a review of the early years of the Academy. Dr. Wright A. Gardner was asked at the eleventh hour to write such a review and he placed in my hands some excellent materials. But owing to the lateness of my request, the copy reached me after the proof had gone back to the printer and the review did not get in. The editor believes this material, together with the early unpublished minutes of the Academy, should be published as soon as the minutes can be found.

In response to an inquiry about the early records of the Academy, a copy of the constitution of the Academy was received from Dr. Walter C. Jones, of Birmingham. This has been published in the Journal.

If the editor may be permitted to make a suggestion it is that a committee be appointed to select certain of the best papers presented each year beginning with 1931 to be published in full or in extended abstracts, while other papers are briefly abstracted.

(Signed) E. V. JONES, Editor.

REPORT OF RESOLUTIONS COMMITTEE

Mr. President:

Your committee wishes to submit the following resolutions:

1. That we the members of the Alabama Academy of Science deeply appreciate the cordial hospitality of the University of Alabama during our eighth annual session.

2. That we acknowledge our indebtedness to our President, Dr. E. B. Carmichael, and his colleagues of the University for their untiring labors in the planning and conduct of the session.

3. That we congratulate this great University on the completion of a century of splendid service and glorious achievement.

(Signed)

FRED ALLISON
C. M. FARMER
E. V. JONES, Chairman

THE NEW YORK ACADEMY OF SCIENCES

77th Street & Central Park West

NEW YORK, N. Y.

THE JOURNAL

of the

ALABAMA ACADEMY
OF SCIENCE

For 1933

VOLUME IV

PROCEEDINGS

of

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HOWARD COLLEGE, 1932

ALSO

FIRST ANNUAL MEETING, MONTGOMERY, 1924

SECOND ANNUAL MEETING, MOBILE, 1925

THIRD ANNUAL MEETING, BIRMINGHAM, 1926

Office of the Editor

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Birmingham, Alabama

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Birmingham, Alabama

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ALABAMA ACADEMY OF SCIENCE

Officers of the Academy

1932-1933

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<i>First Vice-President</i> , J. L. BRAKEFIELD	Howard College, Birmingham, Ala.
<i>Second Vice-President</i> , H. C. HEATH	Woman's College, Montgomery, Ala.
<i>Secretary</i> , EMMETT B. CARMICHAEL	University, Ala.
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1931-1932

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<i>Secretary</i> , JAMES L. BRAKEFIELD	Howard College, Birmingham, Ala.
<i>Treasurer</i> , E. A. HAWK	T. C. I., Ensley, Ala.
<i>Editor of Journal</i> , ERNEST V. JONES	Birmingham-Southern College, Birmingham, Ala.
<i>Councilor to A. A. A. S.</i> , EMMETT B. CARMICHAEL	University, Ala.

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<i>Biology, Medicine and Geology</i> , DR. B. P. KAUFMAN	University
<i>Chemistry, Physics and Mathematics</i> , DR. JOHN XAN	Howard College
<i>Industrial</i> , A. G. OVERTON	Alabama By-Products Corporation

Past Presidents

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JOHN R. SAMPEY Howard College 1927-1928
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FRED ALLISON Auburn 1929-1930
EMMETT B. CARMICHAEL University 1930-1931
GEORGE J. FERTIG Birmingham 1931-1932

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Andrew, Barbara Louise	University, Ala.
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Brakefield, J. L.	Howard College, Birmingham, Ala.
Breckenridge, C. G.	Box 1835, University, Ala.
Burns, M. P.	200 Owen Ave., Bessemer, Ala.
Campbell, Justina	University, Ala.
Cantey, Frank	Birmingham-Southern College, Ala.
Carmichael, E. B.	University, Ala.
Causey, O. S.	Howard College, Birmingham, Ala.
Church, Anna E.	University, Ala.
Clark, B. F.	Birmingham-Southern College, Ala.
Clark, Paul	Castleberry, Ala.
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Conwell, H. E.	Birmingham, Ala.
Corbitt, Fannie	Woman's College, Montgomery, Ala.
Cory, M. D.	Box 337, Gadsden, Ala.
Coulliette, J. H.	Birmingham-Southern College, Ala.
Crane, W. H.	University, Ala.
Cudworth J. R.	University, Ala.
D'Armour, Marie C.	1705 N Avenue, Tuscaloosa, Ala.
Drake, W. W.	Ensley High School, Ensley, Ala.
DuBois, F. S.	University, Ala.
Duggar, J. F.	A. P. I., Auburn, Ala.
Easley, Mary	Woman's College, Montgomery, Ala.
Farmer, C. M.	Troy, Ala.
Farabee, R. L.	University, Ala.
Fennell, R. A.	Birmingham-Southern College, Ala.
Ferguson, Burr	Comer Building, Birmingham, Ala.
Fertig, George J.	4301 Cliff Road, Birmingham, Ala.
Foley, J. O.	University, Ala.
Gandrud, B. W.	406 19th Ave., Tuscaloosa, Ala.
Gardner, W. A.	A. P. I., Auburn, Ala.
Gelders, J. S.	1100 8th Ave., Tuscaloosa, Ala.
Graham, J. Y.	University, Ala.
Graves, Stuart	University, Ala.
Haigler, Doris	5111 13th Ave., Birmingham, Ala.

Hancock, David	Box 826, Birmingham, Ala.
Hare, C. L.	Auburn, Ala.
Harrison, L. M.	Woodlawn High School, Birmingham, Ala.
Harris, Agnes Ellen	University, Ala.
Harper, Roland	University, Ala.
Haughton, Sarah E.	University, Ala.
Heath, H. C.	21 Agnew Street, Montgomery, Ala.
Hess, G. W.	8009 Berney Ave., Birmingham, Ala.
Hobson, S. A.	Jackson, Ala.
Hodges, Robert S.	University, Ala.
Huff, Nelwyn	Birmingham-Southern College, Ala.
Hull, L. H.	Auburn, Ala.
Hunt, T. E.	University, Ala.
Hunt, T. E. (Mrs.)	University, Ala.
Hyde, J. W.	Auburn, Ala.
Ingram, Lillian	Box 1941, University Ave., Tuscaloosa, Ala.
Jackson, L. P.	Masonic Club, Tuscaloosa, Ala.
Johnson, John	Birmingham-Southern College, Ala.
Jones, Ernest V.	Birmingham-Southern College, Ala.
Jones, H. D.	Auburn, Ala.
Jones, W. B.	University, Ala.
Jones, W. C.	T. C. I. Hospital, Birmingham, Ala.
Kassner, J. L.	1000 13th St., Tuscaloosa, Ala.
Kaufman, B. P.	University, Ala.
Keller, Allen Dudley	University, Ala.
Keller, H. S.	Phillips High School, Birmingham, Ala.
Kennedy, J. J.	University, Ala.
Kistler, G. H.	University, Ala.
Leonard, Lillian B.	University, Ala.
Lewis, F. A.	University, Ala.
Littlejohn, W. S.	Medical Arts Building, Birmingham, Ala.
Lloyd, S. J.	University, Ala.
Martin, H. M.	A. P. I., Auburn, Ala.
Matthews, Geo. D.	Watts Bldg., Birmingham, Ala.
McVay, T. N.	University, Ala.
Mobley, Willard M.	Tarrant, Ala.
Montgomery, J. P.	University, Ala.
Moore, E. G.	St. Health Dept., Montgomery, Ala.
Moore, W. A.	Birmingham-Southern College, Ala.
Ott, W. P.	University, Ala.
Overton, A. G.	Tarrant, Ala.
Palmer, G. D.	1001 University Ave., Tuscaloosa, Ala.
Pannell, P. P.	Auburn, Ala.
Poor, R. S.	Birmingham-Southern College, Ala.
Posey, Louis C.	Adamsville, Ala.
Pruitt, C. M.	University, Ala.

Ragsdale, L. V.	Realty Bldg., Bessemer, Ala.
Rehling, C. J.	Auburn, Ala.
Reinke, E. E.	Vanderbilt University, Nashville, Tenn.
Robinson, J. M.	Auburn, Ala.
Robinson, Mary E.	430 Princeton Ave., Birmingham, Ala.
Sampey, John R.	Howard College, Birmingham, Ala.
Scott, Dorothy	University, Ala.
Sell, William	University, Ala.
Simmons, Woodrow	Birmingham-Southern College, Ala.
Sizemore, Troy B.	Tarrant, Ala.
Smith, Septima	711 Queen City Ave., Tuscaloosa, Ala.
Smyth, P. H.	Weather Bureau, Montgomery, Ala.
Spieth, A. M. (Miss)	Livingston, Ala.
Stone, P. T.	Woman's College, Montgomery, Ala.
Swann, Theodore	930 Brown-Marx Bldg., Birmingham, Ala.
Towery, Thera (Miss)	Howard College, Birmingham, Ala.
Troup, Harold E.	University, Ala.
VanAller, T. S.	902 Charleston St., Mobile, Ala.
Wallace, Roberta T. (Mrs.)	
	1512 S. 33rd St., Birmingham, Ala.
Watt, Lucille	Tuscaloosa, Ala.
Whiting, W. A.	Birmingham-Southern College, Ala.
Whitehurst, W. L.	Sheffield, Ala.
Wooten, B. A.	University, Ala.
Yancey, P. H.	Spring Hill College, Ala.
Youngblood, Robert W.	Birmingham, Ala.
Xan, John	Howard College, Birmingham, Ala.

REVISED LIST OF CHARTER MEMBERS

Allison, Fred	Miles, L. E.
Ayrs, O. L.	Miller, E. R.
Basore, C. A.	Oppitz, L. K.
Brannon, Peter A.	Pallister, H. D.
Brooks, Clyde	Robinson, Mary E.
Bunker, P. S.	Robinson, J. M.
Farmer, C. M.	Ross, B. B.
Gardner, W. A.	Sampey, John R.
Graham, J. Y.	Saunders, P. C.
Guyton, F. E.	Sechriest, E. C.
Hinds, W. E.	Smith, Eugene A.
Hoke, Roy E.	Smyth, P. H.
Hubbard, Arah H.	Thomas, F. L.
Ives, S. A.	Whiting, W. A.
Jones, Walter C.	Wood, Thomas A.
Lloyd, Stewart J.	Zeilman, Chas. K.
Loding, H. P.	

TITLES OF PAPERS PRESENTED

March 11th and 12th, 1932.

THE ADDRESS OF THE PRESIDENT—THE DEVELOPMENT OF SCIENTIFIC RESEARCH IN THE SOUTH.

—George J. Fertig.

BIOLOGY AND MEDICINE

“The Babinski Reflex in the Monkey, Baboon, and Chimpanzee.” Part 1 and Part 2. Motion Picture.

—Allen D. Keller, University of Alabama.

“Chromosome Morphology in Plants and Animals.” (Demonstration).

—Berwind P. Kaufman and Barbara Andrew, University of Alabama.

“The Coleoptera of Tuscaloosa and Vicinity.” (Demonstration).

—Joe G. Acee and Septima Smith, University of Alabama.

“Dental Infection and Systemic Disease.”

—Geo. W. Matthews, D.D.S., Birmingham.

“Diagnostic and Therapeutic Artificial Pneumocephalus.”

—W. S. Littlejohn, M.D., Birmingham.

“Differentiation in chorio-allantoic grafts of isolated regions of the early chick blastoderm.”

—T. E. Hunt, University of Alabama.

“The Effect of High Centrifugal Force on the Movement of Paramecium.”

—P. H. Yancey, Spring Hill College.

"Epileptiform and Epileptic Convulsions from Hyperinsulism."

—Seale Harris, M.D., Birmingham.

Hasstilesia tricolor Stiles and Hassall, 1894. A Trematode from the Small Intestine of the Wild Rabbit (*Sylvilagus*)—the First Report of its Occurrence from Alabama. (By title).

—Septima Smith and William Noble, University of Alabama.

"The Microbe Fighters and their Mobilization by Hydrochloric Acid.

—Burr Ferguson, M.D., Birmingham.

"The Morphological Effects of Excess Amounts of Iodine on the Thyroid Gland of the Cat. (By title).

—W. F. Abercrombie, W. H. Crane, and J. L. Brakefield, Howard College.

"Nerve Cells in *Phaeritima Indica*. (Demonstration).

—Lillian B. Leonard and Septima Smith, University of Alabama.

"On the Occurrence of Mesenchymal Degeneration During the Formation of the Auditory Scales.

—James O. Foley, University of Alabama.

"A Convenient Pneumograph." (Demonstration).

—Louis C. Posey and Emmett B. Carmichael, University of Alabama.

"Protozoan and Helminthic Parasites of Man and His Domestic Animals." (Demonstration).

—William Noble and William B. Roberts, University of Alabama.

"The System of Public Health Laboratories in Alabama."

—Lucille Watt, Tuscaloosa Branch of State Board of Health.

"Thabdocoelida in the Vicinity of the University of Alabama. (By title).

—Stella Rentz and Septima Smith, University of Alabama.

"The Role of the Female Sex Hormones in Menstrual Physiology."

—T. M. Boulware, M.D., Birmingham.

"Some Statistics of Leading American Botanists and Zoologists."

—Roland M. Harper, Geological Survey of Alabama.

"Some Studies in the Physiology of Cerebro-Spinal Fluid Pressure."

—G. H. Kistler, University of Alabama.

"Some Studies on Mammalian Gall Bladders."

—F. S. DuBois and E. A. Hunt, University of Alabama.

"Sudden Death."

—Walter C. Jones, M.D., Birmingham.

"A Survey of Trematodes found in Tuscaloosa County. (Demonstration).

—C. G. Breckenridge and Henry Anderson, University of Alabama.

CHEMISTRY

"The Action of Positive Chlorine from Tertiary-butyl-hypochlorite upon a Number of Representative Organic Compounds."

—B. F. Clark, Birmingham-Southern College.

"Alkaline Reduction of Nitrobenzene to Azobenzene and Aniline. (By title).

—J. P. Montgomery, University of Alabama.

"Oxidation of Mercaptans."

—J. R. Sampey, Jr., Howard College.

"The Relative Antiseptic Action of Several Furane Derivatives as Tested Against Bacillus Typhosis and Staphylococcus Aureus.

—B. F. Clark and Gerald Thomas, Birmingham-Southern College.

Sulphur Dyes Produced by Dropping Volatile Organic Substances on Molten Sulphur.

—Geo. D. Palmer, Jr., University of Alabama.

"Tertiary-butyl-hypochlorite, a Convenient Source of Positive Chlorine.

—B. F. Clark, Birmingham-Southern College.

GEOLOGY

"Cyclic Sedimentation in the Pennsylvanian Chain in Alabama Coal Fields."

—Russell Poor, Birmingham-Southern College.

"The Geology of Alabama Caverns."

—Emma A. Ayrs, Birmingham-Southern College.

"New Graptolite Localities in Alabama."

—V. M. Foster, Birmingham-Southern College.

INDUSTRIAL

"Black Opaque Glass from Blast Furnace Slag."

—C. A. Basore and L. H. Hull, Auburn.

"Use of Chromium and Nickel in Grey Iron."

—C. E. Ard, Stockham Pipe and Fitting Co., Birmingham.

"The Clays of Alabama."

—T. N. McVay, University of Alabama.

"Some Effects of Paint Color on Gasoline Evaporation Losses in Storage Tanks."

—E. B. Cordon, Magic City Paint and Varnish Co., Birmingham.

"Foaming and Priming in Boiler Waters."

—John R. Hunt, T. C. I., Birmingham.

"Fuel and Refractory Relationships in the Open Hearth Furnace."

—M. P. Burns, T. C. I., Birmingham.

"Physical Properties of Modern Cast Iron."

—W. H. Spencer, American Cast Iron Pipe Co., Birmingham.

"Unaccounted for Oil Loss in Manufacture of Cotton Seed Products."

—T. M. Francis, Consulting Engineer, Birmingham.

"Scale Formation with Luminous and Non-luminous Flame."

—E. A. Hawk, T. C. I., Birmingham.

"Some Observations on Iron."

—C. S. Whittet, McWane Cast Iron Pipe Co., Birmingham.

"Some Engineering Possibilities of Malleable Cast Iron."

—Fred B. Riggan, Stockham Pipe and Fitting Co., Birmingham.

"A Transparent Aluminum Glass from Blast Furnace Slag."

—C. A. Basore, Auburn.

"Treatment of Black Creek Coal Fines."

—W. M. Mobley, Alabama By-Products Corporation,
Tarrant.

"Micro-Structure of a Wheel Burn."

—Alfred Boyles, T. C. I., Birmingham.

MATHEMATICS AND PHYSICS

"An Introductory Study of Three Functions Believed to be New."

—G. W. Hess, Howard College, Birmingham.

"Further Results on Methods for Analyzing Voltage Nodes and Loops on Marconi and Hertz Antennae."

—Paul D. Bales, Howard College.

"Method of Reducing Error in Measurement of Gravity with Free Fall Apparatus."

—Frank James and Emory Stovall, Howard College.

"A New Use of the Vacuum Tube in Electrometric Titrations, Polarization of Bi-Metallic Electrodes in Oxidation-Reduction Reactions."

—J. L. Kassner, University of Alabama.

MINUTES OF THE NINTH ANNUAL MEETING OF
THE ALABAMA ACADEMY OF SCIENCE
AT HOWARD COLLEGE, MARCH
11TH AND 12TH, 1932

The meeting was called to order at 1:30 p. m., March 11, 1932, in the Science Hall at Howard College, President George J. Fertig presiding. The Academy was welcomed to the College by Acting President T. R. Eagles. A response to the welcome address was made by Dr. E. B. Carmichael, University, Alabama.

President Fertig at 2:00 p. m. called a business session of the Academy. Business transacted: 1. Secretary J. L. Brakefield read the minutes of the eighth annual meeting. Report approved. 2. Dr. E. B. Carmichael gave the report of Councilor to the A. A. S. Report was approved. 3. Dr. J. L. Brakefield reported for the committee on Shingles. Report stated that the shingles had been printed but that the seal had not yet been designed. It was suggested that the president for 1932-33 appoint a committee to design and have made the seal for the shingles. 4. Dr. S. J. Lloyd, chairman of the invitation committee for the meeting of the A. A. S. in Birmingham, reported it to be inadvisable to extend such an invitation at the present time. 5. Dr. E. V. Jones, Editor of Journal, read his annual report. The report was approved. 6. Dr. E. V. Jones urged that further attempts be made to secure the earlier records of the Academy for publication. 7. Dr. J. L. Brakefield gave the treasurer's report for 1931-32. 8. Letters of invitation from Birmingham-Southern College for the 1933 meeting of the Academy were read. 9. Dr. John R. Sampey outlined the program to be followed during the meeting at Howard. 10. President Fertig appointed the following committees: (a) Committee on 1933 Meeting Place; Dr. S. J. Lloyd, Mr. A. G. Overton, Dr. J. R. Sampey; (b) Committee on Resolutions; Dr. E. V. Jones, Dr. J. P. Montgomery; (c) Nominating Committee; Dr. E. B. Carmichael, Dr. C. A. Basore, Dr. Russell Poor, Dr. T. N. McVay; (d) Auditing Committee; Mr. P. D. Bales, Mr. O. S. Causey; (e) Junior Science Clubs; Dr. John Xan, Dr. George D. Palmer, Dr. Roger Allen. 11. Dr. J. L. Brakefield recommended to the Academy that a committee be appointed to investigate the possibility of obtaining a charter from the State of Alabama.

The business session adjourned to convene on Saturday morning at 9:00. Various sections of the Academy immediately went into session for discussion of papers.

The final business session was called to order at 9:00 a. m., Saturday, March 12th, by President George J. Fertig. Business transacted: 1. President Fertig reported that shingles will be mailed at some time during the year. 2. The following committees are to be appointed by the president for 1932-33; (a) Committee on Junior Science Clubs; (b) Committee on Membership; (c) Committee on State Recognition; (d) Committee on Seal for Shingles. 3. The Committee on Invitation recommended that the Academy accept the invitation to meet at Birmingham-Southern College in 1933. Report was adopted. 4. Dr. R. S. Poor read the report of the nominating committee. Report was adopted. 5. The Editor of the Journal was appointed to care for the records of the Academy. 6. Dr. E. V. Jones reported for the resolutions committee. The report was adopted. 7. Mr. P. D. Bales reported for the auditing committee. Report was adopted.

There was considerable discussion relative to the recommendation of the nominating committee that the secretary hold office for a period of three years and longer if so voted by the Academy. No definite action was taken on the matter. Dr. J. L. Brakefield recommended that the officers of the Academy meet at least once a year in addition to the regular meeting of the Academy. No action was taken. Dr. J. L. Brakefield recommended that the secretary, or some person appointed by the president, visit local sections during the year. No action taken. All committees were honorably discharged. The business session was adjourned and the various sections immediately went into session.

The annual banquet was held at the Thomas Jefferson Hotel, Friday evening, March 11th. George J. Fertig gave the presidential address on "The Development of Scientific Research in the South." Dr. E. B. Carmichael was toastmaster.

(Signed) J. L. BRAKEFIELD, Secretary.

REPORT OF THE NOMINATING COMMITTEE OF THE ALABAMA ACADEMY OF SCIENCE, 1932

Officers for 1932-1933

President, Dr. J. F. Duggar, A. P. I.
 First Vice-President, Dr. J. L. Brakefield, Howard.
 Second Vice-President, Dr. H. C. Heath, Woman's College.
 Secretary, Dr. P. Kaufman, University.
 Treasurer, A. G. Overton, Birmingham.
 Editor, Dr. E. V. Jones, Birmingham-Southern.
 Councilor to A. A. A. S., Dr. E. B. Carmichael, University.

Recommendations

1. Office of Secretary to be held a minimum of 3 years with additional service at the discretion of the Academy.

2. That the Editor be instructed to secure permanent, fireproof protection for such important documents of the Academy as he deems essential.

Signed: E. B. CARMICHAEL, Chairman,
 T. N. McVAY,
 C. A. BASORE,
 R. S. POOR.

Report of Treasurer for the Year Ending March 10, 1932

Receipts

Balance in the Woodlawn American National Bank, March 11, 1931.....	\$ 263.25
Membership fees.....	109.00
A. A. A. S.....	17.00
George D. Palmer—Banquet Fund.....	2.65
Dividend from the Woodlawn Savings Bank.....	11.26
Total.....	\$ 403.16

Disbursements

Birmingham Printing Co. (Programs, Journal and Stationery)	\$ 118.40
Returned check.....	1.00
Stamps.....	12.50
Commercial Printing Co. (Shingles and Member Blanks)	12.75
Zac Smith Stationery Co. (Ledger and Sheets).....	6.95
Total.....	\$ 151.60
Total Receipts.....	403.16

Total Disbursements..... 151.60

Balance in Woodlawn American National Bank on
March 11, 1932\$ 251.56

(Signed) J. L. BRAKEFIELD,
Secretary-Treasurer.

Audited by and found correct :

P. D. BALES,
O. S. CAUSEY.

Report of Councilor to A. A. A. S.

Mr. President, Members of the Academy, and Visitors :

The Academy Conference was held on December 28th in New Orleans, during the meetings of the American Association for the Advancement of Science. Several subjects were discussed: publication of papers in the Academy journals, annual dues, methods of financing academies, and high school science clubs (which are sponsored by the state academies). It is with reference to the latter subject, High School Science Clubs, that I am going to give a somewhat extensive report.

Dr. Otis W. Caldwell, of Columbia University, spoke at the New Orleans meeting and said that "Science must have a better way to get down to the lower levels, to get hold of those who may be able to contribute to scientific advancement." One of the ways that such a thing may be accomplished is through junior science organizations. Ten of the states have active junior organizations at present. They are: Illinois, Indiana, Iowa, Kansas, North Carolina, Ohio, Oklahoma, Tennessee, Texas, West Virginia. These junior organizations are usually high school science clubs. Some of them are quite technical and specialized while some are more trivial in nature.

These clubs offer encouragement to both teachers and pupils dealing with the more elementary aspects of science. They furnish a means for finding and aiding young students who have capacity for later doing productive scientific investigation.

The high school science clubs or junior science organizations are affiliated with the State Academy. The advantages to the high school club for having its connection with the State Academy varies in the different states, but the following are the most common :

1. Have a reputable member of the Academy lecture at each club at least once each year.
2. Have a field representative to cover the whole state concerning the organization and activities of the club.

3. Have a special lecture for the clubs at the annual Academy meeting.
4. Have exhibits at a special time during the annual Academy meeting, at which certain prizes are awarded. For example, Illinois uses this method and scientific companies give awards for the best exhibits.
5. Have field trips which are under the supervision of a trained person. Such trips may take place at the time of the annual Academy meeting or at the location of the particular club at any convenient time. Field trips suggested are: botanical, geological, industrial, etc.
6. Record of reports of exhibits in Academy Journal.

Costs to the high school science club and its members for operating under the proposed plan are:

1. Initiation fee of 50c to \$1.00 for each member. This money to be used for local expenses such as stationery, and for expenses of delegate to annual Academy meeting.
2. Club pays one membership dues to the State Academy for the whole club.

Organization:

1. There must be some teacher who will act as sponsor for the club.
2. This teacher must be a member of the Academy.
3. Each club is entitled to one delegate at the annual meeting.
4. There are no shingles for the members of the clubs, but letters of thanks are written to those who have exhibited.
5. The number of meetings held per year is optional with the group.

Insignia:

An enamel pin is used in some of the states.

The various states which have the junior academies movement vary considerably in their activities. One of the most active states is Illinois, with 46 junior academies or clubs. 32 of these had exhibits at the last spring meetings. These were grouped under the following heads:

1. Biology
2. Chemistry
3. General science
4. Physics

While I was at the meeting in New Orleans, the question, "How is Alabama coming with the junior academy movement?" was asked. You know what my answer was. Of the ten states that have active high school science clubs

which are under the supervision of the state academies, five are in the South. I feel that we members of the Alabama Academy of Science have been neglecting this particular activity which seems to be so helpful in sister organizations.

Mr. President, I would like to have the members discuss the advisability of undertaking such a project in Alabama.

EMMETT B. CARMICHAEL, Councilor to A.A.A.S.

Report of the Editor of The Journal

In presenting Volume III of the Journal I wish to call especial attention to the report of "The Organization of The Alabama Academy of Science," by Wright A. Gardner, which follows the membership roll. The partial list of charter members included therein should be made as complete as possible in the next issue of the Journal. The cooperation of each member is urgently requested in securing the names of all members who joined the Academy before June 4th, 1924, "the day agreed upon to close the charter membership roll."

In the minutes of the April meeting at Phillips High School in 1927 we find that the late "Dr. E. A. Smith, of the University of Alabama, was appointed custodian of the library and permanent records of the Academy." Efforts were made during the past year through two channels to locate "the library and permanent records of the Academy" but without success. Further efforts should be made to find these publications and records so that the minutes of the first three annual meetings may be published and thus complete our records.

It seems probable also from Dr. Gardner's report of the organization of the Academy that "the library" contained Volumes I-IX—bound in one volume—of the records of The Alabama Industrial and Scientific Society founded in 1891, which narrowly escaped being named The Alabama Academy of Science. In any event it is highly desirable to have a copy of the records of that early predecessor in the permanent files of the Academy.

Following the action of the Academy at its last annual meeting, the president appointed Dr. Walter C. Jones and the editor as a Publication Committee. This committee earnestly requests the cooperation of the chairman and secretary of each of the sections, and of each member who presents a paper, in providing an abstract of each paper presented before the Academy at this session.

(Signed) E. V. JONES, Editor.

Report of the Resolutions Committee

Be it resolved that we, the members of the Alabama Academy of Science, greatly appreciate the cordial hospitality of Howard College as the host of our ninth annual session and that we hereby record our thanks to the administration, the faculty members and the students of Howard College for their many courtesies and efficient service.

J. P. MONTGOMERY,
E. V. JONES, Chairman.

ABSTRACTS OF PAPERS PRESENTED MARCH 11TH AND 12TH, 1932

THE DEVELOPMENT OF SCIENTIFIC RESEARCH IN THE SOUTH.

—George J. Fertig, Birmingham, Ala.

The address of the retiring president of the Alabama Academy of Science, Birmingham, Alabama, March 11, 1932, reprinted from *Science*, June 10th, 1932.

This presentation of the retiring president of the Alabama Academy of Science sets out in brief resume an account of the establishment of the various institutions of higher education in the South describing concurrently the beginning and development of industrial growth and the demand of industries for assistance from chemistry, physics, medicine, geology, mining engineering, electrical engineering and chemical engineering. A statement is made of the demand for research in the fields just mentioned to aid in the solution of the greatly increasing problems of industries built upon the utility of raw materials of the South.

A number of the contributions so far made by science in general and chemistry in particular are described in specific. Solutions of problems related to the manufacture of rayon, paper, cotton seed products, fertilizers, American tung oil, and blast furnace slag, are given in connection with the origination and improvement of such materials as artificial silk, Kraft paper, absorbent cotton, twine, varnishes, lacquers, celluloid, artificial felts, upholstery, adhesives, potash, xylose, salad oils, cosmetics, soaps, cattle feeds, cotton seed, flour, sardine packing oils, stearic acid for candles, washing powders, roofing tars, cotton rubber, phosphoric acid, phosphoric acid salts, rosin, pine oil, tung oil, varnishes and other materials.

Mention is made of some interesting discoveries in the fields of cotton textiles, cotton dyeing, tobacco, cultivation and preservation of fruits, ceramics, insecticides, petroleum refining, the production of diphenyl, the manufacture of aluminium oxide, the production of helium and many other investigations pertinent to the industrial field.

Mention is made of the South's contribution also to the sciences of Botany, Zoology, Medicine, Anatomy, Surgery, Pharmacology, Pathology and Physics.

The address is terminated with an expression of the hope that the splendid accomplishments of the last fifty years would serve as an

ever accelerating stimulus to even finer academic and industrial attainments through continuations of scientific research in the south, by southern workers for southern development.

BIOLOGY AND MEDICINE

THE BABINSKI REFLEX IN THE MONKEY, BABOON AND CHIMPANZEE. Part 1 and Part 2. Motion Picture.

—Allen D. Keller, University of Alabama.

(Previously published in monograph form.)

CHROMOSOME MORPHOLOGY IN PLANTS AND ANIMALS. (Demonstration.)

—Berwind P. Kaufman and Barbara Andrew, University of Alabama.

Somatic and meiotic chromosomes of *Tradescantia*, *Allium*, *Lilium*, *Pinus* and *Drosophila* show the chromatin organized in the form of coiled threads or chromonemata. Somatic chromosomes of *Tradescantia* and *Lilium* on demonstration show quadripartite metaphase structure, the secondary split having occurred in the prophase. Chromonemata are well demonstrated in young salivary gland nuclei of *Drosophila virilis* and *D. melanogaster*.

THE COLEOPTERA OF TUSCALOOSA AND VICINITY. (Demonstration).

—Joe G. Acee and Septima Smith, University of Alabama.

*DENTAL INFECTION AND SYSTEMIC DISEASE.

—Geo. W. Matthews, D.D.S., Birmingham.

*DIAGNOSTIC AND THERAPEUTIC ARTIFICIAL PNEUMOCEPHALUS.

—W. S. Littlejohn, M.D., Birmingham.

DIFFERENTIATION IN CHORIO-ALLANTOIC GRAFTS OF ISOLATED REGIONS OF THE EARLY CHICK BLASTODERM.

—T. E. Hunt, University of Alabama.

Chorio-allantoic grafts from various transverse levels including parts of the node and primitive streak show that there is a gradient in developmental potencies. These potencies are greatest in the level containing the anterior half of the node and gradually decrease as more

posterior levels of the node region are approached. Beyond this region there is first a marked and then a gradual diminution of capacity in the more posterior levels of the streak. The gradient is evidenced by the kinds of structures and tissues developing in grafts of different levels, by more frequent occurrence in a particular level of structures in the grafts of certain levels than in others.

Further evidence is given of the existence of a developmental correlation between nervous system and notochord since the former is most normally developed in grafts where notochord occurs most frequently and is most poorly developed where notochord is absent.

Judging from the results of these experiments the center of development is considered to be a circular area 0.3 to 0.4 mm. in diameter. This corresponds approximately to the position of Hensen's node. Surrounding this center of greater potentiality is an area 0.5 to 0.6 mm. in diameter which has a lesser capacity for differentiation and which has been designated the 'node field.'

THE EFFECT OF HIGH CENTRIFUGAL FORCE ON THE MOVEMENT OF PARAMECIUM.

—P. H. Yancey, Spring Hill College.

Paramecia were subjected to high centrifugal force (4000-30000 times gravity) and their movement observed both during centrifuging, by means of Harvey's Centrifuge-Microscope, and afterwards. At the beginning of centrifuging the animals are passively thrown to the periphery of the container but soon react against the force tending to swim in the opposite direction. However, due to packing, they slide over one another sideways. When moving against the centrifugal force the heavier particles are thrown down to the posterior end of the animals, so that they finally come to rest with the posterior end outward.

The after-effects of centrifuging on movement are: (1) slowing or complete cessation, depending on the strength of the force employed and the time it acts on the organisms, though individual differences were observed, especially in regard to size of the animal, the larger ones usually being more affected than the small ones. (2) loss of orientation and abnormal types of movement; (3) loss of negative geotropism.

These changes are interpreted as being due to internal disorganization of the cell, especially to displacement of the substances of greater specific gravity than the surrounding protoplasm, but also possibly to the disturbance of such internal structures as the neuro-motor apparatus.

EPILEPTIFORM AND EPILEPTIC CONVULSIONS FROM HYPERINSULISM.

—Seale Harris, M.D., Birmingham.

Hypoglycemia with its concomitant symptoms due to spontaneous excessive secretion of insulin by the islet cells of the pancreas was first recognized by Harris, in 1923, and was called by him hyperinsulism. It

is essentially a disease of the pancreas. The symptoms are usually identical with those produced by overdoses of insulin given to diabetics. The manifestations, however, may be like those of epilepsy (epileptiform) or actually epileptic in type.

A review of thirteen reported American cases of epileptiform hyperinsulism shows that five were controlled by dieting; three were cured clinically by removal of adenomata of the pancreas; three were unimproved after partial resection of the pancreas; and two died. The surgical treatment of hyperinsulism is promising, though difficult and dangerous.

The author reports three cases of typical cases of epilepsy associated with hyperinsulism and hypoglycemia. Two of these were markedly improved by dieting; the third refused treatment. Harris does not claim that spontaneous excessive secretion of insulin is the cause of epilepsy but suggests that there may be a small group of epileptics in which the hypoglycemia of hyperinsulism is a factor in the production of the attacks.

In the light of recent investigations, it seems advisable to make blood sugar tests in all cases of recurring attacks of convulsions and unconsciousness, whether epileptic or not, in which the cause of the attacks has not been determined. Such studies on epileptics might relieve some of them of the stigma of epilepsy and place them in the group of pancreatic disease. In such cases of hyperinsulism, there is hope of relief by dietary management. And, if that fails, surgery may be employed.

HASSTILESIA TRICOLOR, Stiles and Hassal, 1894. A Trematode from the Small Intestine of the Wild Rabbit (*Sylvilagus*)—the first Report of its Occurrence from Alabama. (By title).

—Septima Smith and William Noble, University of Alabama.

*THE MICROBE FIGHTERS AND THEIR MOBILIZATION BY HYDROCHLORIC ACID.

—Burr Ferguson, M.D., Birmingham.

THE MORPHOLOGICAL EFFECTS OF EXCESS AMOUNTS OF IODINE ON THE THYROID GLAND OF THE CAT. (By title).

—W. F. Abercrombie, W. H. Crane and J. L. Brakefield, Howard College.

NERVE CELLS IN *PHAERITIMA INDICA*.

—Lillian B. Leonard, University of Alabama.

In a study of the nervous system of *Phaeritima indica* (an annelid), based upon serial histologic preparations stained with hematoxylin and eosin and with silver, four types of nerve cells were seen. Anteriorly

in the ventral nerve cord giant cells on either side of the midline and in the lateral portions of the ganglia were connected with the median giant nerve fibers. Laterally in the nerve cord unipolar and bipolar motor cells were scattered among the giant cells and contributed fibers to the giant and body nerves. In the pharynx ganglion cells gave off processes which passed anteriorly, posteriorly, and caudally in the tissues between the muscular and glandular layers of the gut tract. Finally, from isolated small sensory cells in the epidermis fine fibers dipped down into the subepidermal nerve plexus.

Whether or not true Nissel substance exists in these various cells was not established. With this exception the nerve cells of *Phacritima indica* cytologically resemble, in general, those of other animals.

ON THE OCCURRENCE OF MESENCHYMAL DEGENERATION DURING THE FORMATION OF THE AUDITORY SCALAE.

—James O. Foley, University of Alabama.

In the cat development of the scalae is accomplished by two processes, one, an increase in size of the tissue spaces by a separation and retraction of connecting cytoplasmic strands and the other, by degeneration and subsequent detachment of portions of mesenchyma. The former is indicated by more robust connections between cells; the latter, by retrogressive changes and phagocytosis. Connective-tissue macrophages immediately remove many of these products of degeneration. Other scavengers coalesce to form large plasmodia which in turn become the center of phagocytic actions.

These observations, together with those previously reported on the pig, would seem to emphasize the importance of degeneration and phagocytosis during the development of the scalae in mammals.

A CONVENIENT PNEUMOGRAPH.

—Louis C. Posey and Emmett B. Carmichael, University of Alabama.

This pneumograph may be assembled in almost any physiological laboratory and can be used to record the respiratory frequency of laboratory animals without sacrifice of the latter. The set-up is convenient for measuring the respiratory rate of guinea-pigs, rabbits, rats, mice, adults, dogs, and cats. A rate as high as 200 per minute may be easily recorded.

The equipment required for the pneumograph is as follows: one muscle-lever, one extension rod with axis, one small and one large weight, one ringstand, one right-angle clamp, one kymograph, towels, or waste, a metal plate (a kymograph fan will do), a piece of string and one animal board.

By placing the animal on his back upon the concave animal board and by the use of towels, it is possible to take advantage of the fact that the thoracic and abdominal walls expand and contract during respiration, and thus to control the direction of the motion. The ani-

mal is placed on the animal board with the ventral side up and is packed by means of towels or waste so that the major part of the motion is vertical. When anaesthetics are used, it is well to place a towel over the animal's trunk to prevent loss of body heat.

When the animal is in position, the larger weight is allowed to rest upon the metal plate, which has previously been placed on the abdomen or the thorax, depending upon the desired amplitude. This weight is attached to the muscle-lever by means of a string. On the opposite end of the lever (the writing end), may be suspended a smaller weight to insure the sensitivity. On inspiration the lever makes a down-stroke and on expiration it makes an up-stroke.

The principle of the lever as explained here-in can be used for measuring the rate of respiration of human beings if one will shorten the lever and elevate the kymograph.

PROTOZOAN AND HELMINTHIC PARASITES OF MAN AND HIS DOMESTIC ANIMALS. (Demonstration).

—William Noble and William B. Roberts, University of Alabama.

*THE SYSTEM OF PUBLIC HEALTH LABORATORIES IN ALABAMA.

—Lucille Watt, Tuscaloosa Branch of State Board of Health.

THABDOCOELIDA IN THE VICINITY OF THE UNIVERSITY OF ALABAMA. (By title).

—Stella Rentz and Septima Smith, University of Alabama.

ROLE OF THE FEMALE SEX HORMONES IN MENSTRUAL PHYSIOLOGY.

—T. M. Boulware, M.D., Birmingham.

On a basis of much experimental work, a plausible theory of the physiological sequence of menstruation is advanced. Starting with the development and maturity of the ovarian follicle, it appears quite likely that this maturity is a direct result of stimulation from the anterior pituitary lobe.

With follicular maturity we have the appearance of the follicular hormone, esterin, which for several days prior to menstruation stimulates the uterine mucosa and ultimately brings about the premenstrual proliferative phase in preparation for the ovum.

The corpus luteum hormone, progestin, appears soon after ovulation. If fertilization and implantation occur, a persistence of the corpus luteum hormone is necessary for trophic uterine changes which permit the development of the fetus. If fertilization fails to occur, the corpus luteum secretion is only transitory and menstrual flow is initiated. It seems logical to attribute the onset of menstrual flow to a cessation of the corpus luteum secretion.

Further assumption is made that the developing placenta originates a hormone which acts upon the anterior pituitary lobe, which in turn stimulates the ovarian corpus luteum to continued activity. From the above description, it would seem that the well-being and development of pregnancy is dependent upon a circle of events. If this be true, the cause of the onset of labor may be found by the determination of just where this physiological circle is broken. The placenta and its hormone appear to be the most logical site of break.

One practical application of this new knowledge has been the development of a highly accurate test for pregnancy, which is based upon the fact that large amounts of anterior pituitary hormones are present early in the urine of a pregnant woman. By injecting animals with such urines, characteristic follicle and lutein reactions may be demonstrated in the ovaries of the test animal.

SOME STATISTICS OF LEADING AMERICAN BOTANISTS AND ZOOLOGISTS.

—Roland M. Harper, University of Alabama.

This study is based on 142 botanists and 191 zoologists who are indicated (by stars) as leaders in their field in the latest (1927) edition of *American Men of Science*, together with 35 deceased botanists who were starred in previous editions, and 71 botanists listed in *Who's Who in America* but not starred. Eight of the botanists and the same number of zoologists are women.

The botanists were born and educated mostly in northeastern United States (one in Alabama), and most of them still live in that part of the country. Nearly all are college graduates, and most of them have doctors' degrees. They graduated from college at the average age of 23. About 95% of the men are married (a few twice), and the average age at first marriage was 30. They average just about two children each, with more sons than daughters. The older men have larger families than the younger. Among the few who indicated religious preferences, Episcopalians and Presbyterians lead. As to scientific interests, the largest group, especially among the older men, is the taxonomists. Pathologists and physiologists rank next.

The zoologists resemble the botanists pretty closely as to birth-places (two from Alabama), education, age at graduation and marriage; but they have a few more daughters than sons. In religion, Unitarians and Presbyterians lead. Their specialties are hard to classify, on account of the complexity of the field, but invertebrates, genetics, and heredity seem to be the favorite subjects.

Very few of these scientific leaders have distinguished sons as yet, but about one in four have brothers, cousins or other near relatives who have accomplished something in science.

SOME STUDIES IN THE PHYSIOLOGY OF THE CEREBRO-SPINAL FLUID.

—Gene H. Kistler, University of Alabama.

Anesthetized dogs were used and the cerebrospinal fluid pressure was recorded through a needle in the cisterna magna or lumbar subarachnoid space.

Due to the multiplicity of experimental variables and the broad field over which observations were made, any final conclusions are unwarranted. However, the following facts are indicated strongly enough to deserve mention and further study.

There is no single "intracranial pressure", *per se*. It is practically impossible to state the normal cerebrospinal fluid pressure of a dog except at a given time under carefully controlled conditions. The pressure in dogs untouched and under constant anesthesia rose to four times the original within three hours. Lowering body temperature without shivering increased the fluid pressure as much as 100 mm. per degree centigrade, followed by a return to normal with elevation of temperature. Increased muscle tone produced by shivering, stretching and like movements caused a marked rise in pressure, as did sneezing, coughing and deep breathing. The pressure was repeatedly elevated to several times the original height by tension on the chest, even in dogs dead for several minutes. This was probably due to increased cerebral volume.

The cisternal pressure was from 10 to 40 mm. of fluid higher than the lumbar when the two were recorded simultaneously. They fluctuated synchronously with manipulation.

The amount of isotonic fluid taken in or spinal fluid formed under a given pressure is directly proportional to the degree of pressure. This indicates that the formation and resorption of cerebrospinal fluid may be in part a filtration process.

SOME STUDIES ON MAMMALIAN GALL BLADDERS.

—Franklin S. DuBois and Eleanor A. Hunt, University of Alabama.

In a comparative cholecystographic study of the evacuation of the gall bladder in cats and opossums marked differences were noted in the reaction of the two species to a meal of egg yolk and cream.

The twelve cats exhibited two distinct methods of evacuating the gall bladder, seven of them discharging more than half of the contents within forty-five minutes after the cystic duct begins to fill (in which respect they resemble the human gall bladder), and five emptying very slowly over a long period of time. At the expiration of the period of contraction, the halogenated oil was completely evacuated in about five cases and only a small drop remained in the other seven.

The twelve opossums, on the other hand, consistently exhibited incomplete emptying of the gall bladder, rarely more than half and usually less than a third of the contents. Not only was there an initial delay (an average of eighteen minutes elapsing before oil entered the cystic duct), but the principal period of discharge was limited to an average of 107 minutes, as against 177 minutes in the twelve cats. These striking differences in the reaction of the gall bladder of the opossum to food are only partially explained by such anatomical differences as the greater size of the gall bladder, its thinner muscular tunic, its tenuous cystic duct, the extramural position of the ampulla of Vater (the latter exhibiting marked peristalsis), and a reduction in absorptive area of the small intestine.

SUDDEN DEATH.

—Walter C. Jones, M. D., Birmingham.

Sudden death is more common than is realized. The lives of perhaps fifteen per cent of our total population are in more or less immediate jeopardy. And most of these persons are apparently in good or at least fair health; or if they are ill, death comes weeks or months or even years before it is anticipated.

A combination of several causes (most frequently two to four) is the cause of death in more than half of all cases.

The three immediately vital systems involved in sudden death are the respiratory, circulatory, and nervous systems. The two most common chronic, underlying, drastically fatal maladies are arteriosclerosis and nephritis. Fatty degeneration of the liver occurs with great frequency. So-called myocarditis is uncommon.

A large variety of causes play a part more or less frequently in the production of sudden death. One hundred and fifty to two hundred separate causative factors can be enumerated easily.

Most cases of sudden death occur in middle life.

Heredity is an important factor in sudden death, which has not yet been sufficiently evaluated.

A considerable proportion of sudden death can be prevented:

1. By further development of accident-prevention measures.
2. By periodic health examinations.

A SURVEY OF TREMATODES FOUND IN TUSCALOOSA COUNTY. (Demonstration).

—C. G. Breckenridge and Henry Anderson, University of Alabama.

CHEMISTRY

THE ACTION OF POSITIVE CHLORINE FROM TERTIARY-BUTYL HYPOCHLORITE UPON A NUMBER OF REPRESENTATIVE ORGANIC COMPOUNDS.

—B. F. Clark, Birmingham-Southern College.

The effects of treating various organic compounds with a chloroform solution of tertiary-butyl hydrochlorite were described. The reagent is both a chlorinating and oxidizing agent and hence many interesting reactions occurred. In general, the reactions were quite vigorous and had to be conducted at low temperatures. Primary alcohols were first converted into hypochlorites by the reagent and then spontaneously decomposed into the corresponding aldehydes. Benzaldehyde was converted into benzoyl chloride. Phenols are readily chlorinated and a trace of oxidized material is also found. Hydroquinone is first converted into quinhydrone and then into quinone, with no chlorinated materials being found. Trichloro phenol gave rise to tetrachloro quinone. Acids were unaffected and hydrocarbons only slightly by the reagent. Ketones and ethers were readily chlorinated.

ALKALINE REDUCTION OF NITROBENZENE TO AZOBENZENE AND ANILINE. (By title).

—J. P. Montgomery, University of Alabama.

OXIDATION OF MERCAPTANS.

—J. R. Sampey, Jr., Howard College.

The effects of various methods of oxidation of several mercaptans were studied. The oxidation was catalyzed by the use of small amounts of cobalt or manganese oleates. Mercaptans were readily oxidized in alkaline media since they are quite sensitive towards alkalis in general. Solutions of bromine and iodine were also used and found to be reliable for the purpose of estimation of mercaptans. It is necessary, however, to have the mercaptans stand with the halogen for a period of twenty-four hours to cause complete reaction, since an intermediate compound is found which would lead to false results if the time intervals were shorter.

THE RELATIVE ANTISEPTIC ACTION OF SEVERAL FURANE DERIVATIVES AS TESTED AGAINST BACILLUS TYPHOSIS AND STAPHYLOCOCCUS AUREUS.

—B. F. Clark and Gerald Thomas, Birmingham-Southern College.

The phenol coefficients of a number of furane derivatives were determined in an effort to find which particular class of derivatives were the best antiseptics. Furfural had phenol coefficient slightly under 1.0, the c. p. material having a lower coefficient than the technical grade, probably explainable by a very potent impurity whose identity is unknown as yet. Furfuryl alcohol, methyl furyl ether, furfuryl acetone, and hydrofuranamide were all weak antiseptics. Furoin and furil had no action. Furoic acid had a phenol coefficient of about 6.0, while furylacrylic acid, alpha methyl furyl-acrylic acid, and apha ethyl furyl-acrylic acids were still better antiseptics. The physiological effects of the materials tested are unknown, but are now being investigated.

SULPHUR DYES PRODUCED BY DROPPING VOLATILE ORGANIC SUBSTANCE ON MOLTEN SULPHUR.

—George D. Palmer, Jr., University of Alabama.

It has been found that any organic compound containing hydrogen will give rise to a sulphur dye when dropped into molten sulphur. A large number of organic compounds have been tried. After the requisite amount of an organic compound has been dropped into the molten sulphur, the mass is allowed to solidify, is ground up and extracted with carbon bisulphide in a Soxhlet extractor for several hours to remove the excess of sulphur.

Dyes of various shades of yellow, khaki, brown, and black have been prepared by this method. No blue or good red dyes have been

made as yet. The actual structure of these dyes is still unknown, although there is considerable evidence to show that they contain long chains of sulphur atoms.

TERTIARY-BUTYL HYPOCHLORITE, A CONVENIENT SOURCE OF POSITIVE CHLORINE.

—B. F. Clark, Birmingham-Southern College.

The hypochlorites all readily liberate positively charged chlorine. Hypochlorous acid and the alkaline hypochlorites are not sufficiently stable and so the use of alkyl hypochlorites was investigated. Tertiary-butyl and tertiary-amyl hypochlorites are the most stable of the group and the butyl compound was chosen because the alcohol from which it is prepared is cheap and readily available. The calculated quantities of tertiary-butyl alcohol, acetic acid, ice, and sodium hypochlorite, are shaken together, upon which a yellow oil forms and is collected in a separatory funnel. The hypochlorite as prepared is over 98% pure and should be used immediately because it slowly decomposes on standing. It can be distilled, but considerable decomposition takes place.

GEOLOGY

CYCLIC SEDIMENTATION IN THE PENNSYLVANIAN CHAIN IN ALABAMA COAL FIELDS.

—R. S. Poor, Birmingham-Southern College.

An attempt was made, to show that the coal deposits in, at least the Cahaba Coal Field, of Alabama had been deposited along with their enclosed sediments in rhythmic fashion. These rythms had given rise to what might be called Cycles of Sedimentation. The ideal cycle was designated as being initiated by uplift and consequent erosion and followed by a series of continental, consisting chiefly of river-laid sands and muds. The continental series was completed by a swamp land condition in which prolific vegetation grew, fell and decayed, giving the potential set-up for coal formation through normal formation of peat and other early coal stages, due to the loss of water, carbon dioxide and marsh gas. This concluded that portion of the cycle, the marine portion followed. Following the swamp land condition there was a submergence of the land probably due to overloading and consequent isostatic adjustment. This marine invasion was always in the nature of shallow sea, and as a result the first deposit on top of the coal would normally be mud or sand, and as the sea gradually deepened or cleared, more calcareous deposits would be expected. These limy deposits as a rule conclude the cycle, and sea withdrawal caused the continental phase to be renewed.

This work has only just begun, therefore, no extended conclusion can be drawn. It should be made clear, however, that the author is merely applying to the Alabama section what has been formerly well worked out by Weller and Wanless in Illinois.

THE GEOLOGY OF ALABAMA CAVERNS.

—Emma A. Ayrs, Birmingham-Southern College.

Detailed measurements of strike and dip along outcrops and exposures within the cave called Alabama Caverns, near Clay, Alabama, coupled with an accurate plane-table survey within the cave showed conclusively that this cavern developed along a strike joint, i.e., parallel to the outcropping edge of the Chickamauga dolomitic limestone in which it is located.

The cavern is about one-half mile long and very sinuous. Its greatest height within is about 80 feet. Undoubtedly the ground-water solution producing it occurred along a strike joint. The latter was produced when the Appalachian Mountains were folded at the close of the Paleozoic era. There is some evidence to show that at least a part of the solution occurred below the ground-water table, but most of it probably occurred above this level by vadose water after folding. The ground-water level is now about 20 feet below the lowest traveled portion of the cavern.

NEW GRAPTOLITE LOCALITIES IN ALABAMA.

—V. M. Foster, Birmingham-Southern College.

On the Montevallo road two miles west of Calera, Alabama, there occurs an outcrop of Athens shale of Ordovician age. Recent highway excavations have made excellent exposures. The Athens shale at this point contains an abundance of graptolites notable not only for their numbers but also their variety. At least one new species and possibly several more have been discovered to date. These are to be studied by Dr. Rudemann of New York.

The balance of the paper consisted of a description of the biology and habitat of these specific graptolites and their respective values as index fossils.

INDUSTRIAL

A BLACK GLASS FROM BLAST FURNACE SLAG.

—C. A. Basore and L. H. Hull, Auburn.

A process for the production of opaque black glass from blast furnace slag and ordinary building sand has been developed and studied in detail. The effect of variations in the process has been studied and the optimum conditions for the process determined. The glass has been made on both a laboratory and a large laboratory or small semi-plant scale.

The black color of the glass depends apparently upon the stabilizing of sodium sulfide in the product.

The glass has some very interesting properties. The results of testing the black glass show it to possess a high tensile strength and a remarkable resistance to corrosion by boiling water, hot sodium hydroxide, and boiling hydrochloric acid. The glass has a beautiful gloss and a very attractive appearance.

The results of the experimental work indicate that a black glass of good quality can be produced from the slag at a low cost. A saving estimated of 40% in the cost of raw materials should be realized.

Its chief uses would probably be for building and decorative purposes. It is suggested for black tiles, flooring, wainscoating, pilasters for buildings and similar purposes. The glass is also highly decorative and might be employed for vases.

USE OF CHROMIUM AND NICKEL IN GREY IRON.

—C. E. Ard, Stockham Pipe and Fittings Co., Birmingham.

This paper sets out a number of the effects which chromium and nickel have as additions to ordinary grey cast iron. The advantages which each of these elements give in the way of increased physical properties and certain chemical resistance to such forces as corrosion are described. Metallographic explanations are given for the improved properties which these two alloys singly and together give to grey iron.

*THE CLAYS OF ALABAMA.

T. N. McVay, University of Alabama.

*SOME EFFECTS OF PAINT COLOR ON GASOLINE EVAPORATION LOSSES IN STORAGE TANKS.

—E. B. Cordon, Magic City Paint and Varnish Co, Birmingham.

FOAMING AND PRIMING IN BOILER WATERS.

—J. R. Hunt, T. C. I., Birmingham.

Foaming and Priming is the least understood of all boiler water problems.

Moisture in steam is objectionable because it contains dissolved and suspended solids which are deposited, causing clogged pipes. The attritive action of these solids carried by the steam causes erosion and excessive wearing of the operating units.

Locomotives pull 40% more when operated by dry steam. Moisture in steam is attributed to Foaming and Priming.

Causes of Foaming and Priming:

Foaming is the formation of froth upon the surface of the water in the boiler, which interferes with the free escape of steam.

Priming is the entrainment of water in the form of misty droplets in the steam leaving the boiler. This is caused by inadequate or incorrect boiler design or irregular manner of operation. The chemical composition of the boiler water is a related factor, but at present no direct correlation can be made.

Foaming is divided into two parts; bubble formation and bubble stabilization. Bubble formation is due to the change in surface ten-

sion, due to the concentration of dissolved salts in the feed water. These bubble films are stabilized by the presence of finely divided solids, or vice-versa. These conditions represent two extremes. Intermediate conditions will also cause foaming.

Practical Considerations:

The first consideration in any problem in water chemistry is the testing and selecting of the proper water supply. Success in water conditioning is a result of recognizing the difficulties and avoiding them rather than combating them.

There are three general systems by means of which foaming can be controlled; Blow-down—Intermittent or Continuous; Deconcentrators, and Chemical Treatment. These are all based upon the scheme of reducing the concentration of either the dissolved or suspended solids, or both.

Finally it is noted that no specific set of data can be applied to boilers in general, as each boiler is an individual problem which can only be solved by experiment.

*FUEL AND REFRACTORY RELATIONSHIPS IN THE OPEN HEARTH FURNACE.

—M. P. Burns, T. C. I., Birmingham.

PHYSICAL PROPERTIES OF MODERN CAST IRON.

—W. H. Spencer, American Cast Iron Pipe Co., Birmingham.

There have been great improvements in the physical properties of cast iron in the last two decades.

Tensile strength increased from 25,000 pounds per sq. in. to 70,000 pounds per sq. in.

Modulus of rupture is now from 70,000 pounds to 100,000 pounds per sq. in.

Compressive strength in high test irons is now 165,000 to 190,000 pounds per sq. in.

Toughness as measured by Izod test on unnotched bars is 950 pounds per sq. in. in absorbed energy.

Fatigue limit is 56% of the ultimate strength.

Growth has been reduced by 99%.

Corrosion resistance in various media, always good in cast iron, has been greatly improved.

The means of obtaining all these results are alloys, heat treatment, and a careful metallurgical control of the cast iron.

UNACCOUNTED FOR OIL LOSS IN MANUFACTURE OF COTTON SEED PRODUCTS.

—T. M. Francis, Consulting Engineer, Birmingham.

This paper describes certain losses incurred in the attempt on plant scale to remove the oil contained in the cotton seed but does not

attempt to explain where in the entire recovery process these losses occur or where attempts at improving efficiencies of recovery might be directed. This presentation designedly is of the interrogatory rather than the declaratory type.

SCALE FORMATION WITH LUMINOUS AND NON-LUMINOUS FLAME.

—E. A. Hawk, T. C. I., Birmingham.

On account of the increase in the number of luminous, radiant, or smoke burners on the market to-day, a comparison is made of the scale formations in the reheating of steel with luminous and non-luminous flames.

Briefly, the non-luminous flame, obtained by premixing and proportioning gas and air, produces a thin scale-structure, mostly Fe_3O_4 , which does not increase appreciably with time of heating.

The luminous flame, which is essentially not a premix of gas and air, prevents over-oxidation at low temperatures such as in sheet mill practice, while at higher temperatures an unstable scale structure, mostly FeO , is formed. This formation (FeO) has a lower melting point than Fe_3O_4 , and frees itself more readily from the steel surface. This is an advantage in rolling slabs and flats. With temperature raised to the melting point of the scale structure, it is termed a "wash heat". The "wash heat" will increase scale loss unless carefully controlled.

Repeated heating up to rolling temperature and cooling or excessive firing and dampering, increases scale, as Fe_3O_4 is first formed, followed by the FeO formation at higher temperatures and then reverting to Fe_3O_4 again. Analyses of scales show the inner surface next to the iron surface to be largely FeO , while the outer surface is mostly Fe_3O_4 , and in some cases Fe_2O_3 . As conditions favor the formation of FeO , more Fe must be taken from the iron or steel surface to satisfy the existing oxygen in the scale structure, so that with luminous flame there is a building up and a breaking down of scale structures, which process can serve to advantage, or cause excessive scale loss.

The recent innovation of the diffusion burner combines the advantages of gas and air proportioning with the advantages of the carbon-bearing flame.

*SOME OBSERVATIONS ON IRON.

—C. S. Whittet, McWane Cast Iron Pipe Co., Birmingham.

SOME ENGINEERING POSSIBILITIES OF MALLEABLE CAST IRON.

—Fred B. Riggan, Stockham Pipe and Fitting Co., Birmingham.

The demand for new materials to meet highly specialized duties necessitate originality and knowledge on the part of the metallurgist. He must know the service required in order to produce a satisfactory product for severe service.

The author gives examples of two properties of malleable iron that he believes will be of commercial importance.

First—Forged Malleable Cast Iron gives a strength of over one hundred thousand pounds per square inch.

Second—Suitable alloys in malleable cast iron increases its resistance to corrosion, in some acids, to twelve times that of normal malleable.

A TRANSPARENT ALUMINUM GLASS FROM BLAST FURNACE SLAG.

—C. A. Basore, Auburn.

A process for the production of a transparent aluminum glass from blast furnace slag and building sand has been developed and studied in detail. The effect of variations in the process has been studied and the optimum conditions for making the glass determined. The glass has been made on both a laboratory and a large laboratory or small semi-plant scale.

The glass has a high specific gravity, a very high tensile strength, a relatively low coefficient of expansion, a good thermal endurance and a remarkable resistance to corrosion by boiling water, hot sodium hydroxide, and boiling hydrochloric acid. The product is further characterized by its elasticity and its toughness.

The glass is suggested for bottles, jars and similar purposes, as a lining for kettles, tanks and similar pieces of chemical equipment, for building and construction purposes such as glass floors, tiles, and the like, and for decorative purposes.

The low cost of production and the excellent properties of the glass should make its commercial production a worth-while enterprise.

TREATMENT OF BLACK CREEK COAL FINES.

—W. M. Mobley, Alabama By-Products Corp., Tarrant.

This paper deals with various plant scale experiments attempted to remove the fire clay and rock content of coals taken from the Black Creek seam of Alabama. Behavior of Deister-Overstrom tables and of systems of oil flotation on the fines is described and figures of efficiency of several steps of cleaning are given. It was concluded that from an economic standpoint cleaning costs would increase too greatly the cost of the product.

MICRO-STRUCTURE OF A WHEEL BURN

—Alfred Boyles, T. C. I., Birmingham.

Wheel burns are caused by the drivers of a locomotive spinning on the track. Examination of the rail head revealed a layer of hardened metal at the point of contact with the wheel. This hardened layer was found to be martensite, with small amounts of troostite and sorbite. The transition from martensite to pearlite was very abrupt. It

was concluded that the friction of the wheel on the rail heated a limited amount of metal to a temperature above the critical range of the steel in question. A quenching action followed due to the greater mass of cold steel beneath.

MATHEMATICS AND PHYSICS

AN INTRODUCTORY STUDY OF THREE FUNCTIONS BELIEVED TO BE NEW

—G. W. Hess, Howard College.

The expansion of the three series:

$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \dots$$

$$e^{ix} = 1 + ix - \frac{x^2}{2!} - \frac{x^3}{3!} + \frac{x^4}{4!} + \dots$$

$$e^{-ix} = 1 - ix - \frac{x^2}{2!} + \frac{x^3}{3!} - \frac{x^4}{4!} + \dots$$

was demonstrated and the possible practical applications of these series was discussed at considerable length.

FURTHER RESULTS ON METHODS FOR ANALYZING VOLTAGE NODES AND LOOPS ON MARCONI AND HERTZ ANTENNAE

—Paul D. Bales, Howard College.

The lead-in wires were connected at the exact center of the antennae because of the fact that the energy was at a maximum at the ends of the wire and zero at the center, whereas the current was zero at the ends and attained a maximum at the center. The lead-in wires, besides being connected at the center of the antennae also give their best results when their length is 30% that of the antennae and they are tapped off at right angles. In determining the length of aerial for best transmission it was found that the impedance of the aerial must match that of the feeder. With the present equipment a modulation of 90-95% is possible and a good tone quality is obtained.

METHOD OF REDUCING ERROR IN MEASUREMENT OF GRAVITY WITH FREE FALL APPARATUS

—Frank James and Emory Stovall, Howard College.

The usual form of free fall apparatus usually involves the use of tuning fork, the action of which is somewhat damped by contact

with the recording tape. Slight changes in temperature also affect the fork and hence a more dependable method of timing was sought. By the use of a device involving the use of a synchronous motor and the method of beats it was possible to exactly mark off intervals of any length desired. The time-interval used in the experiments was $1/30$ of a second. The corrected values obtained, 979.6, 979.4, 979.4, show that this method gives readily reproducible results, with a low percentage of error.

A NEW USE OF THE VACUUM TUBE IN ELECTROMETRIC TITRATIONS, POLARIZATION OF BI-METALLIC ELECTRODES IN OXIDATION-REDUCTION REACTIONS

—J. L. Kassner, University of Alabama.

A new apparatus was demonstrated which possessed the following novel features: positive potential imposed as grid instead of the usual negative, grid current is employed to polarize the platinum electrodes, and the equivalence point is indicated by a "kick" of a sensitive galvanometer in the plate circuit. In addition the end-point possesses the following characteristics: approach is indicated, over-running is immediately apparent, high sensitivity, the plotting and recording of readings is unnecessary, tubes of the same type give the same equivalence point, and adjustments are unnecessary during titrations. The titration of ferrous iron was demonstrated and it was readily apparent that this ordinarily difficult titration is easily and accurately accomplished by means of this apparatus.

MINUTES OF THE FIRST MEETING OF THE ALABAMA ACADEMY OF SCIENCE, APRIL 4th, 1924.

The Alabama Academy of Science was called to order by Dr. Wright A. Gardner at 9 o'clock on April 4th, 1924, in the Sidney Lanier High School of Montgomery.

On motion Dr. Gardner was elected temporary chairman and S. A. Ives temporary secretary.

Motion passed for the chair to appoint a nominating committee. Dr. H. D. Pallister, Dr. W. C. Jones and Dr. L. E. Miles were named.

On motion papers were limited to 15 minutes with five minutes for discussion.

The following papers and addresses were presented:

"Historical Sketch of the Alabama Industrial and Scientific Society," Eugene Allen Smith.

"Some Effects of Eating Velvet Beans," Emerson R. Miller.

"Velvet Beans and Brood Sows," Wright A. Gardner and E. R. Miller.

"Abnormal Deviations of the Spine," Chas. K. Zeilman.

"Low Temperature Precipitation of Iron," C. A. Basore read by E. R. Miller.

"Ozone Manufacture and the Energy Relations in Its Formation," P. C. Saunders.

"Electrolytic Calcium Arsenate," Stewart J. Lloyd.

"Recent Ravages of *Sparia incurvata*," L. E. Miles.

At an informal meeting during the lunch hour a committee on Constitution and By-Laws consisting of H. D. Pallister, Miss Mary Robinson, and Walter C. Jones, was appointed by the chairman and instructed to bring in a report at the afternoon session.

Afternoon Session

Following papers presented:

"The Eye and Visual Education," E. E. Sechriest.

"Chemical Composition of the Acorn," E. R. Miller.

"Ecological Survey of the Flora of the Birmingham District," S. A. Ives.

"The Velvet Bean as Food," E. R. Miller.

"Mining Engineering at the University of Alabama," H. D. Pallister.

Business Session

Report of the Committee on Nominations. The following officers were elected for the ensuing year:

Dr. Wright A. Gardner, President.

Dr. H. D. Pallister, First Vice-President.

Dr. Walter C. Jones, Second Vice-President.

Sumner A. Ives, Secretary-Treasurer.

Dr. Eugene Allen Smith, Honorary Dean.

Report of the Committee on Constitution and By-Laws.

A tentative constitution and by-laws was submitted which was taken up section by section and disposed of by vote. A copy of the Constitution and By-Laws as adopted is herewith appended. (Published in the 1930 Journal, Vol. 2, page 20. Editor.)

Additional papers presented:

"Pymonthemum Tullia," Koellia Britton & Brown, E. R. Miller.

"The Boll Weevil in Alabama," Warren E. Hinds.

"Distribution of Toxic Bearing Substances in Soils," Wright A. Gardner.

Adjournment.

Signed: S. A. IVES, Secretary.

MINUTES OF THE SECOND ANNUAL MEETING OF THE ALABAMA ACADEMY OF SCIENCE, APRIL 3rd, 1925

The Alabama Academy of Science was called to order by President Wright A. Gardner at 9:20 A.M. in the Scottish Rite Cathedral building, Mobile.

Eleven members answered roll call. A number of visitors were introduced.

Minutes of the Montgomery meeting of 1924 read and approved. The Constitution of the Academy was read.

A Committee on Resolutions, composed of W. C. Jones, R. W. Allen and R. E. Hoke, was appointed by the President. A Nominating Committee was named of the following personnel: E. R. Miller, H. D.

Loding, and W. A. Whiting. S. A. Ives, J. R. Sampey and Miss Mary Robinson were appointed as a Committee on Time and Place of the Next Annual Meeting of the Academy. Miss Robinson, J. R. Sampey, and R. E. Hoke were asked to serve as a committee looking to the arrangement of a dinner for the evening of April 3rd. These committees were instructed to report at the afternoon session.

A motion was made and carried that the presentation of each paper on the program be limited to a maximum of 30 minutes.

The following papers were presented and quite extensively discussed:

Progress of the Study of Anthropology in Alabama, Peter A. Brannon.

The New Theory of Valence Applied to Halogen Phenols and Naphthols, John R. Sampey, Howard College.

Development of Speed and Accuracy in Typewriting, Roy E. Hoke, Birmingham-Southern College.

The Activation of Hydrogen in Organic Compounds, Roger W. Allen, Howard College.

Some New Aspects of the Ether, Miss Mary Robinson, Phillips High School, Birmingham.

Are Winters Becoming Colder? Miss Mary Robinson, Phillips High School, Birmingham.

Afternoon Session—2:30

The following officers were elected for 1925-26:

President—Wright A. Gardner, Auburn.

First Vice-President—H. D. Pallister, University.

Second Vice-President—Walter C. Jones, Birmingham-Southern.

Secretary-Treasurer—Roger W. Allen, Howard.

The Committee on Time and Place of Meeting recommended that the Academy meet in Birmingham in 1926 at the time of the Alabama Educational Association.

The committee appointed to arrange for a dinner reported that one would be held at the Cawthorn Hotel at 7:30 P. M.

Motion was passed instructing the Secretary to attempt to secure the publication of the proceedings of this and of the Montgomery meeting.

A number of visiting scientists were proposed for membership and duly elected.

The following papers were presented and discussed.

Carbon Monoxide Poisoning, Walter C. Jones, Birmingham-Southern.

New Aspects of Dairying Bacteriology, W. A. Whiting, Birmingham-Southern.

Temperature Relation and Seasonal Growth of Winter Legumes, J. F. Duggar, Auburn.

Decomposition of Chlorophyll, W. A. Gardner, Auburn.

A New Indicator for Titrations with Potassium Dichromate, J. R. Sampey and J. G. Riddle, Howard.

Laboratory Methods of Investigating Johnson Grass Hay, K. G. Baker (read by E. R. Miller).

Influence of Plant Diseases in Decreasing the Food Value of Plants, E. R. Miller, Auburn.

The Non-Protein Nitrogen of the Velvet Bean, E. R. Miller.

Mobile Flora and Fauna, H. P. Loding, Mobile.

Adjournment.

(Signed) S. A. IVES, Secretary.

MINUTES OF THE THIRD ANNUAL MEETING OF THE ALABAMA ACADEMY OF SCIENCE,

MARCH 26 and 27, 1926

The Alabama Academy of Science was called to order by the Secretary-Treasurer at 9:40 A.M. in Room 112, Phillips High School Birmingham. Due to the enforced absence of the other officers of the Academy nominations were requested from the floor for temporary chairman. J. Y. Graham was nominated and unanimously elected to this office.

Fifty members answered roll call. Eighty visitors were present. Minutes of the Mobile meeting of 1925 read and approved.

The Constitution of the Academy was read.

The temporary chairman turned over the meeting to Second Vice-President W. C. Jones upon his arrival.

A Committee on Resolutions composed of S. A. Ives and J. F. Duggar was appointed and requested to report at the Saturday session.

The following papers were presented and discussed:

Studies on the Syntheses and Elimination of Certain Bile Components in Jaundice, James L. Brakefield, Judson College.

Rate of Nodulation and Growth of Leguminous Plants as Affected by Temperature, J. F. Duggar, Auburn.

A Recent Discovery of a Rich Devonian Fauna in Alabama, Walter B. Jones, University of Alabama.

Alkaline Electrolytic Iron, S. J. Lloyd, University of Alabama.

The Fertilizer Resources of Alabama, B. B. Ross, Auburn.

Static Conditions and Atmospheric Pressure with Regard to Radio Reception, Patrick H. Smyth, Montgomery.

Types of Ringworm of the Feet in Some of the Southern States, Virginia C. Brogdon, Howard.

Blood Coagulation with Special Reference to a New Alkaloid, J. A. Ward, Howard.

Correlation of High School and College Mathematics, T. R. Eagles, Howard.

The meeting adjourned at 12:40 P. M. for a luncheon at the Hillman Hotel.

President W. A. Gardner arrived in time to preside at the luncheon.

The President appointed a Nominating Committee composed of J. Y. Graham, J. R. Sampey and C. H. Kibbey. This committee was asked to report at the Saturday morning session.

Following the luncheon an inspection trip to the T. C. I. Ensley steel plant was enjoyed.

Saturday Session

The meeting reconvened at 9:20 A. M., President Gardner presiding. The presentation of papers was continued:

A Brief Account of the Meteorological Observations and Researches in Alabama, Jesse W. Smith, Montgomery.

A Report on the Occurrence of *Kerona pediculus*, Gertrude Osburn and Y. S. Graham.

Color Formation in the Velvet Bean: A New Phase of Plant Pigmentation, E. R. Miller, Auburn.

Ecological Survey of the Mentone Region, S. A. Ives, Howard.

Studies of the Mammalian Ureter, Walter C. Jones, Birmingham-Southern College.

The Control of Fly Bourne Infections through Control of Fly Reproduction, C. H. Kibbey, Birmingham.

Tantalum vs. Platinum as Cathode Metals in Certain Electrolytic Determinations, F. P. Lasseter and James R. Withrow, Howard.

X-Rays and Crystal Structure, Louis K. Oppitz, Howard.

Modern Theories of Atomic Structure, J. R. Sampey and Everett McDonough.

Carbon-Halogen Linkage: Acid Hydrolysis of Certain Halogen Phenols and Naphthols, J. R. Sampey, Howard.

Forestry as Applied Science, Page S. Bunker, Montgomery.

A Method of Shortening and Strengthening Primary School Work, Sarah A. Abernathy, Montgomery.

A business session was held at 12:15 P. M.:

Twenty-seven new members were elected.

The desirability of making application for membership in the American Association for the Advancement of Science was brought up and discussed quite extensively. President Gardner reported that he had recently discussed this question with the permanent Secretary of the A. A. A. S. He reports that he was directed to have the Alabama Academy file application for membership and that this application would receive consideration on April 25th.

Motion (C. H. Kibbey) made and seconded (L. K. Oppitz) and unanimously carried that the Secretary be instructed to file such an application.

The question of publication of the proceedings of the Academy was brought up and extensively discussed.

Motion (J. F. Duggar) made and seconded (W. C. Jones) and unanimously passed that a committee be appointed to work with the secretary in taking charge of the publication of abstracts of the papers presented before the Academy at the Montgomery, Mobile and Birmingham meetings and to submit a plan to the Academy at its next annual meeting for yearly publication of the proceedings. W. C. Jones (Chairman), E. R. Miller and L. K. Oppitz were appointed on this committee.

The Resolutions Committee submitted its report. It was unanimously adopted

A committee was appointed to examine the Treasurer's report. The report was approved.

The Nominating Committee proposed the following for election to office:

S. J. Lloyd—President.

W. C. Jones—First Vice-President.

J. F. Duggar—Second Vice-President.

J. R. Sampey—Secretary-Treasurer.

The report was seconded and unanimously adopted.

Meeting adjourned.

(Signed) ROGER W. ALLEN, Secretary.

1939

NEW YORK ACADEMY OF SCIENCES
77th Street & Central Park West
NEW YORK, N. Y.

THE JOURNAL

of the

ALABAMA ACADEMY
OF SCIENCE

For 1934

VOLUME V

PROCEEDINGS

of

THE TENTH ANNUAL MEETING
BIRMINGHAM-SOUTHERN COLLEGE, 1933

Office of the Editor
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1932-1933

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Harris, Agnes Ellen	University, Ala.
Harper, Roland M. (C)	University, Ala.
Heath, H. C. (B)	21 Agnew St., Montgomery, Ala.
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Ingram, Lillian (F)	Box 1941, University Ave., Tuscaloosa, Ala.
Jackson, L. P.	Masonic Club, Tuscaloosa, Ala.
Johnson, G. B. (B)	Auburn, Ala.
Johnson, John (C)	Birmingham-Southern College, Ala.
Jones, Ernest V. (B)	Birmingham-Southern College, Ala.
Jones, H. D. (B)	Auburn, Ala.
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Jones, W. C. (F)	T. C. I. Hospital, Birmingham, Ala.
Kassner, J. L. (B)	1000 13th St., Tuscaloosa, Ala.
Kaufman, B. P. (A)	University, Ala.
Keller, Allen Dudley (F)	University, Ala.
Keller, H. S. (G)	Phillips High School, Birmingham, Ala.
Kennedy, J. J. (F)	University, Ala.
Keoughan, Modesta Lopez (A)	960 Dauphin St., Mobile, Ala.
Kistler, G. H. (F)	University, Ala.
Lamar, Jule K. (B)	Birmingham-Southern College, Ala.
Lang, E. C. (A)	Spring Hill College, Mobile, Ala.
Leonard, Lillian B. (F)	University, Ala.
Levie, M. (B)	Auburn, Ala.
Lewis, F. A. (E)	University, Ala.
Littlejohn, W. S. (F)	Medical Arts Bldg., Birmingham, Ala.
Lloyd, S. J. (C)	University, Ala.
Martin, H. M. (B)	Auburn, Ala.
Matthews, Geo. D. (F)	Watts Bldg., Birmingham, Ala.
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Missbach, George Elliot (B)	University, Ala.
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Poor, R. S. (C)	Birmingham-Southern College, Ala.
Posey, Louis C. (F)	Adamsville, Ala.

Rehling, C. J.	Auburn, Ala.
Reinke, E. E. (A)	Vanderbilt University, Nashville, Tenn.
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Robinson, Mary E.	430 Princeton Ave., Birmingham, Ala.
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Sell, William (F)	University, Ala.
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Sizemore, Troy B. (D)	Tarrant, Ala.
Smith, Septima (A)	711 Queen City Ave., Tuscaloosa, Ala.
Smyth, P. H. (G)	.....	Weather Bureau, Montgomery, Ala.
Spieith, A. M. (Miss) (A)	.....	Livingston, Ala.
Stone, P. T. (B)	.....	Woman's College, Montgomery, Ala.
Swann, Theodore (D)	.....	.....
	.....	930 Brown-Marx Bldg., Birmingham, Ala.
Towery, Thera (Miss) (A)	.....	Howard College, Ala.
Tribby, W. W. (B)	.....	521 12th Ave., Tuscaloosa, Ala.
Troup, Harold E. (F)	.....	University, Ala.
VanAller, T. S. (F)	.....	902 Charleston St., Mobile, Ala.
Watt, Lucille (A)	.....	Tuscaloosa, Ala.
Walsh, Mary Vincent (B)	.....	Visitation Academy, Mobile, Ala.
Westland, A. F. (E)	.....	Spring Hill College, Mobile, Ala.
White, W. E. (A)	.....	Box 1712, University, Ala.
Whiting, W. A. (A)	.....	Birmingham-Southern College, Ala.
Woolley, Mary (B)	.....	Murphy High School, Mobile, Ala.
Yancey, P. H. (A)	Spring Hill College, Mobile, Ala.
Youngblood, Robert W.	Birmingham, Ala.
Xan, John (B)	Howard College, Ala.

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Basore, C. A.	Jones, Walter B.	Sampey, John R.
Brannon, Peter A.	Jones, Walter C.	Saunders, P. C.
Brooks, Clyde	Knapke, Bede, Rev.	Sechriest, E. C.
Bunker, P. S.	Lloyd, Stewart J.	Smith, Eugene A.
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Gardner, W. A.	Miles, L. E.	Thomas, F. L.
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Guyton, F. E.	Oppitz, L. K.	Wood, Thomas A.
Hinds, W. E.	Pallister, H. D.	Zeilman, Chas. K.
Hoke, Roy E.	Robinson, Mary E.	

The letters (A), (B), (C), (D), (E) and (F) indicate: (A) Biology; (B) Chemistry; (C) Geology, Archaeology and Anthropology; (D) Industry; (E) Mathematics; (F) Medicine; (G) Physics.

TITLES OF PAPERS PRESENTED

March 10th and 11th, 1933, at Birmingham-Southern College

THE ADDRESS OF THE PRESIDENT—THE INCREASING NEED FOR POPULARIZING THE NATURAL SCIENCES.

J. F. Duggar, Alabama Polytechnic Institute.

GENERAL MEETINGS

“Some Eighteenth Century Vital Statistics.”

—Roland M. Harper, University of Alabama.

“The Moundville Culture.”

—Walter B. Jones, University of Alabama.

BIOLOGY

“A Cyprus Swamp in the Appalachian Valley of Alabama.”

—Roland M. Harper, University of Alabama.

“Cystocercous Cercariae from Alabama and Georgia.” (Also by demonstration). (Lantern).

—Septima Smith, University of Alabama.

“Effect of Certain Foods on the pH of Urine.”—Preliminary study.

—John Xan, Howard College.

“Effect of Cherokee Mineral Water on Induced Polyneuritis in Rats.”—Preliminary study.

—Jule Lamar, Birmingham-Southern College.

“Effect of Experimental Cell Disorganization on the Heredity of Paramecium.”

—P. H. Yancey, Spring Hill College.

“Effect of Various Fertilizer Chemicals on the Development of Root Nodules on the Peanut Plant.”

—J. F. Duggar, Alabama Polytechnic Inst.

“Feeding Rate of Amoeba Proteus on Bacteria-free Chlomonas Paramecium.”

—Richard A. Fennell, Birmingham-Southern College.

"Study of the History of the Germ Cells in Foetal Pigs."
—Jule Lamar, Birmingham-Southern College.

"Morphological Effects of Excess Amounts of Iodine on the Thyroid Gland of the Cat."

—W. F. Abercrombie; W. H. Crane, and James L. Brakefield, Howard College.

"Physiological Effect of Some Derivatives of Furfural."
—Harold E. Johnson, Birmingham-Southern College.

"Relation of the Endocrine Glands to the Female Sex Cycle."
—W. E. Prescott, Howard College.

"Studies on Normal Blood. III. The Rabbit and the Guinea Pig."

—James L. Brakefield, Howard College.

CHEMISTRY

"Some New Ethers of the Aliphatic Series."
—B. F. Clark, Birmingham-Southern College.

"The Determination of the Fineness of Potters' Flint by a Sedimentation Method."

—T. M. McVay, University of Alabama.

"A Study of the Furoin Condensation."
—B. F. Clark, Birmingham-Southern College.

"The Preparation of Furyl-acrylic Acid and Methyl-furyl-acrylic Acid."

—B. F. Clark, and H. E. Johnson, Birmingham-Southern College.

"A Glass Electrode Apparatus and its Application in Hydrogen-Ion Measurements."

—James A. Naftel, Alabama Polytechnic Inst.

"The Application of the Glass Electrode to a Study of the Quinhydrone Electrode Error in Soils of Alabama."

—James A. Naftel, Alabama Polytechnic Inst.

"Preparation of New Hydrazones of Hydrazine Hydrate."
—John Xan, Howard College.

"Apparatus for the Determination of Iodine in Foods."
—B. F. Clark, and C. H. Winfield, Birmingham-Southern College.

"Determination of Lead in Alloys."
—James L. Kassner, University of Alabama.

"Some Quantitative Studies of the Localization of Uranium in the Principal Organs of Rabbits During the Course of Uranium Intoxication by Use of the 'Magneto-Optic Method.'"
—H. D. Jones, Roy Goslin, K. D. Crane, and G. B. Johnson, Alabama Polytechnic Institute.

"The Oleoresins of Capsicum."
—George J. Fertig, Birmingham.

"A Study of the Effect of Recrystallization of Reagent Quality Chemicals on pH Values of Standard Buffer Solutions."
—James L. Kassner, Ernest Lindsay Oden, University of Alabama.

"Some Schiff Bases Prepared from Furfural."
—B. F. Clark, and T. D. Farr, Birmingham-Southern College.

"Preparation of Selenium Organic Compounds."
—George D. Palmer, and Stewart J. Lloyd, University of Alabama.

"Recent Developments in Slag Glass."
—C. A. Basore, Alabama Polytechnic Institute.

GEOLOGY AND ARCHAEOLOGY

"Aboriginal Occupation of Alabama."
—Walter B. Jones, State Geologist, University.

"The Use of Insoluble Residues in Sub-surface Correlation."
—T. G. Andrews, Department of Geology, University of Alabama.

"Regional Devolatilization of Alabama Coals."
—Charles Blair, Geologist, T. C. I., Birmingham.

“Some Representative Fossils of the Cretaceous-Eocene Contact in Alabama.”

—Winnie McGlamery. Geological Survey of Alabama, University.

INDUSTRY

“Air Conditioning.”

—T. L. Bissell, Alabama Power Company, Birmingham.

“The Advent of Air Conditioning in the Home.”

—E. A. Hawk, T. C. I., Birmingham.

“Gravity Concentration of Red Iron Ores.”

—B. W. Gandrud, U. S. Bureau of Mines Station, University.

“The Heat Polymerization of Tung Oil.”

—E. V. Jones, Birmingham-Southern College.

“Utilization of Metallurgical Wastes.”

—C. A. Basore, Alabama Polytechnic Institute.

“Some Slack Time Research.”

—Ray L. Farabee, University of Alabama.

“Technocracy.”

—J. M. Gallalee, University of Alabama.

MATHEMATICS AND PHYSICS

“An Integration Problem Involving a New Trigonometric Summation.”

—W. A. Moore, Birmingham-Southern College.

“An Interesting Function from Elementary Calculus.”

—William Sell, University of Alabama.

“A Simple Solution of the Quartic Equation.”

—George W. Hess, Howard College.

*“Method in Demonstrating Tone Quality by Means of Variable Impedance Audio Amplifier.”

—Paul D. Bales, Howard College.

* By title only.

“On the Interpretation of the Results of the ‘Magneto-Optic’ Experiments as Showing a Time Lag for the Faraday Effect.”

—W. N. Arnquist, Alabama Polytechnic Institute.

“Polarity of Magnetic Iron Oxide.”

—C. S. Whittet, Birmingham.

“Quasi Regular Polyhedrons.”

—William Sell, University of Alabama.

MEDICINE

“Phases in the Development of Blood Transfusion.” (Lantern).

—James M. Mason, M.D., Birmingham.

“Bone Growth as a Result of Stimulation.”

—E. W. Patton, D.D.S.

“Burns.”

—R. W. Waldrop, M.D., Bessemer.

“Elliptical Red Blood Cells in Man.” (Lantern).

—Sarah H. McCarty, Birmingham.

“Focal Infections in Infants.”

—W. S. Wilson, D.D.S., Fairfield.

“Food Poisoning Due to Staphylococci.”

—Ralph McBurney, M.D., University of Alabama.

“Fractures of the Spine.”

—Earle H. Conwell, M.D., Fairfield.

“Further Observations on the Reaction of the Opossum Gall Bladder.” (Lantern).

—Franklin S. DuBois, M.D., and Gene H. Kistler, M.D.,
University of Alabama.

“The Differentiation of the Mesectoderm an Mesentoderm and of the Early Chick Blastoderm in Chorio-allantoic Grafts.” (Lantern).

—Thomas E. Hunt, University of Alabama.

“Observations on Localization of Central Vaso-tonic Impulses.”

—W. K. Hare, University.

"Morphologic Changes Produced in the Stomach and Bowel by Intramural Injection of Barbiturates. (Lantern).

—Gene H. Kistler, M.D., University of Alabama.

"Nutrition and Its Relation to Calcium Metabolism. (Lantern).

—George W. Matthews, D.D.S., Birmingham.

"An Attempt to Imitate Pregnancy Tests by Means of Drugs."

—Marie C. D'Amour, University of Alabama.

"Pneumonia Fatalities and Occupation."

—C. H. Kibbey, M.D., Fairfield.

"Manifestations of Premature Old Age in Americans."

—Henry R. Carter, M.D., Birmingham.

"Rabies in Dog and Man with Special Reference to Immunization of Dogs."

—D. A. Piatt, M.D.C.; V.S., Birmingham.

"The Action of Rattlesnake Venom upon Respiration."

—Louis C. Posey, and Emmett B. Carmichael, University of Alabama.

"The Action of Radium on Normal and Malignant Tissue Cells." (Moving Pictures).

—M. Y. Dabney, M.D., Birmingham.

"Experimental Studies on the Possible Poisonous Properties of the Spider, *Latrodectus Mactans*."

—A. W. Blair, University of Alabama.

"The Growth Characteristic of Tumor Cells in Serous Fluids." (Lantern).

—George S. Graham, M.D., Birmingham.

"Ulceration in the Digestive Tract and Disturbances in Digestion Following Experimental Lesions in the Brain Stem. (Lantern).

—A. D. Keller, W. K. Hare, and Marie C. D'Amour, University of Alabama.

“Some Experimental Studies on the Vagus Nerve. (Lantern).”

—James O. Foley, and Franklin S. DuBois, M.D., University of Alabama.

DEMONSTRATIONS

“Apparatus for a Very Gradual Change of Fluids in Histological Technique.”

—Henry J. Walker, Jr., University of Alabama.

“A Mechanical Method for Successful Isolation of Bacteria by the Streak Plate Method.”

—William Kindred Wilson, University of Alabama.

“Typical Moundville Artifacts.”

—Walter B. Jones, State Geologist and Director of Museum, University.

PAPERS READ BY TITLE

“Reduction of Disulfides in Hydrocarbon Solutions.”

—John R. Sampey, Howard College.

“The Effects of Rattlesnake Venom Upon the Total Volume of Blood Cells.”

—Leon H. Bakst, and Emmett B. Carmichael, University of Alabama.

**MINUTES OF THE TENTH ANNUAL MEETING OF
THE ALABAMA ACADEMY OF SCIENCE AT
BIRMINGHAM-SOUTHERN COLLEGE,
MARCH 10th and 11th, 1933**

The meeting was called to order by President F. F. Duggar, at 10:00 o'clock Friday morning, March 10th, in Munger Memorial Hall.

The Academy was welcomed to Birmingham-Southern College by President Guy E. Snively and to Birmingham by Mr. Sam Clabaugh, President of the Birmingham Chamber of Commerce. Dr. James L. Brakefield, First Vice-President of the Academy, responded to these addresses.

The first business session was called to order by President J. F. Duggar at 10:30 A. M. 1. The Secretary, Emmett B. Carmichael, read the minutes of the ninth annual meeting. Minutes were approved. 2. President J. F. Duggar explained to the Academy why it had been necessary to appoint a new secretary to fill the vacancy made by Dr. B. P. Kaufman's departure from the state a few weeks after taking office. It was stated that Dr. Carmichael consented to act as secretary after the second request by President J. F. Duggar. 3. Dr. John R. Sampey, Chairman of the High School Science Club Committee, reported on the organization of the Junior Academy of Science in Alabama. Report approved. Report appended. 4. Dr. E. V. Jones, Editor of the Journal, read his annual report. 5. Dr. Emmett B. Carmichael, Councilor to A. A. A. S., read his report and it was approved. 6. Dr. R. S. Poor, Chairman of the local committee, gave a report on arrangements. 7. Amendments to the constitution: (See note at end of Minutes.) 8. Mr. A. G. Overton gave the treasurer's report for 1932-33. 9. Dr. E. B. Carmichael reported that shingles had been delivered to some of the members and that others should expect them in the near future. 10. Appointment of committees: (a) Auditing Committee: Mr. W. A. Moore, Chairman; R. M. Harper and Dr. John Xan. (b) Nominating Committee: Mr. P. D. Bales, Chairman; Dr. Roland Harper; Dr. Roger W. Allen; Dr. Walter C. Jones; and Dr. C. H. Kibbey. (c) Resolutions Committee: Dr. James L. Brakefield, Chairman; Dr. S. J. Lloyd; Dr. James M. Mason; L. M. Harrison; and Mary Robinson.

The business session was adjourned to convene on Saturday at 9:30 A. M.

There was a joint session of the Academy at 12:00 noon, at which Dr. Roland Harper gave a paper on "Some Eighteenth Century Vital Statistics."

A Photograph of the Academy was taken at 12:30 P. M. in front of Munger Memorial Hall.

The various sections of the Academy went into session at 2:00 P. M. Friday for the presentation and discussion of papers.

The annual banquet was held at 7:00 P. M. Friday in the Student Activities Building. Following the banquet the members and guests adjourned to the auditorium, Munger Memorial Hall, for two papers. Dr. Walter B. Jones discussed "The Moundville Culture", and Professor J. F. Duggar gave the presidential address "The Increasing Need for Popularizing the Natural Sciences."

The annual reception, which was held in the Stockham Building, followed the presentation of the addresses.

The final business session was called to order at 9:30 A. M., Saturday, March 11th, by President J. F. Duggar. Business transacted: 1. Amendment to the constitution: (See note at end of Minutes.) 2. Report of work of committee on state recognition. There was no formal report and, in the absence of Dr. H. C. Heath, chairman of the committee, the secretary read some correspondence from the chairman. It was decided to continue the same committee and have a formal report next year. (The correspondence was filed by the secretary). 3. Mr. W. A. Moore reported for the auditing committee. Report was adopted. (See Treasurer's report). 4. Dr. James L. Brakefield read the report of the resolutions committee expressing the appreciation of the Academy to the hosts of the meeting. 5. Mr. P. D. Bales reported for the nominating committee. Report was adopted. Report appended. 6. On a motion by Dr. S. J. Lloyd, it was voted to add a new section to the four we have. The new section is to be called: Geology, Anthropology, and Archaeology. 7. Mobile was selected as the meeting place for 1934. 8. Dr. E. B. Carmichael reported that he had collected most of the files of the officers of the Academy. The correspondence for the first ten years is to be bound and deposited with the Editor. 9. Dr. E. B. Carmichael moved that a committee be appointed to collect photographs of deceased scientists who worked in our state and of active members of our Academy. The motion was carried. 10. A vote of thanks was given the local committee for their untiring efforts in making the meeting a success. 11. Dr. James L. Brakefield expressed his appreciation and regard for President J. F. Duggar and suggested that the Academy express its appreciation by a rising vote. The vote was unanimous. 12. All committees were honorably discharged. 13. The business session was adjourned and the various sections immediately went into session.

(Signed) EMMETT B. CARMICHAEL, Secretary.
March 15, 1933.

Note 1. The following amendments of the constitution were adopted:

1. That each of the major sections organize and elect a chairman and secretary. That the chairmen automatically become vice-presidents of the Academy, that they be listed alphabetically according to sections, and that their names appear on the stationery.

2. That the executive committee consist of the officers elected by the whole membership, the several vice-presidents, chairmen of all standing committees, and the past presidents, *ex officio*. That this executive committee meet previous to regular business session for consideration of such business as should come before them.

3. That the dues for members who have a four-year collegiate degree, but who are pursuing graduate work, or who are fellowship students or student assistants be lowered to \$1.00.

Note 2. The 1933 meeting was one of the best in the history of the Academy. Seventy papers were presented. Sixty members and one hundred and four visitors registered at the meetings. The chief interests of the members were recorded as follows: Biology 12, Chemistry 20, Geology 6, Mathematics 5, Medicine 12, Physics 4.—(Editor.)

REPORTS OF COMMITTEES AND OFFICERS

Report of Nominating Committee for Officers of the Alabama Academy of Science for the year 1933-34.

President—1. J. L. Brakefield.
2. *R. S. Poor.

Secretary—1. *P. H. Yancey.
2. W. A. Whiting.

Treasurer—A. G. Overton.

Editor of Journal—Ernest V. Jones.

Councilor—E. B. Carmichael.

PAUL D. BALES, Chairman.

Committee Members:
ROLAND HARPER,
ROGER ALLEN,
W. C. JONES,
DR. KIBBEY,
PAUL D. BALES, Chairman.

*At his urgent request this member's name was dropped from the nominations. (Editor).

Report of Committee on Organization of a Junior Academy

Mr. President and Members of the Academy:

Your Committee on the Organization of a Junior Academy felt that the last page of the printed program of the Tenth Annual Meeting of the Alabama Academy of Science constituted its report. From the program you will see that ten high schools accepted invitations to attend the organization meeting. The committee calls especial attention to the fact that five of these are without the City of Birmingham, and we look upon this as a promise of a truly state-wide organization in the future.

Your committee drew up a four-fold program for the organization meeting. First, brief talks by two members of the Alabama Academy of Science, Dr. E. B. Carmichael speaking on "The Junior Academy Movement," and Dr. R. W. Allen on "The Chemist and His Molecules." The committee feels that this formal contribution from the Alabama Academy should be a part of the young people's program each year, and it should supplement the informal contacts which the joint meetings will inevitably produce to the mutual benefit of both organizations. The second feature of the program is the scientific session of eleven papers to be given by the students; judging from the titles, some of these give promise of unusual merit. The third feature will doubtless prove of most interest to members of the senior body, and each of you is given a personal invitation to visit the scientific exhibits set up in Room 22 of the Science Hall. Awards will be given for the three best exhibits in the Biological Division and three prizes for the best in the Physical Division. The fourth and most essential phase of the initial program is the business session. Each school has elected a delegate to represent it at this organization meeting, and voting will be limited to these authorized delegates.

Your committee wishes to submit the following recommendations:

1. That our committee be continued with such additions as may become necessary for expansion into other parts of the state.
2. That this committee, together with the newly elected officers of the Junior Academy, draw up a constitution and a program for the 1934 meeting. This constitution to be adopted by the Junior Academy, subject to the approval of the parent organization. This constitution to follow as closely as is consistent with our own local situation, the recommendations of the American Association for the Advancement of Science.
3. That this committee be authorized to draft any member of the Senior Academy for service as a speaker for the high school

clubs which hold membership in the Junior Academy.

Respectfully submitted,

*

R. W. ALLEN,
W. M. JACKSON,
J. P. MONTGOMERY,
R. S. POOR,
P. T. STONE,
JOHN XAN,
J. R. SAMPEY, Chairman.

*By vote of the Academy Mr. P. H. Yancey was added to the Committee for the ensuing year.

Report of Treasurer for the Year Ending March 10, 1933 Receipts

Balance on hand March 11, 1932, Woodlawn	
American Nat'l Bank.....	\$ 251.56
Banquet Fund.....	9.00
Membership fees 1932.....	43.00
Membership fees 1933.....	111.00
American Association for the Advancement of of Science.....	20.50
Dividend Woodlawn American Nat'l Bank.....	1.61
	<hr/>
Total Receipts.....	\$ 436.67

Disbursements

Stamps.....	\$ 8.34
Banquet Guests (Miss Tamery).....	11.00
Orchestra.....	10.00
Expenses, J. L. Brakefield (1932).....	10.00
Dr. John Xan (Expenses as Chairman of Sec- tion).....	2.10
Paul D. Bales (Programs).....	1.00
Commercial Printing Company (Programs).....	36.75
Alabama Printing Company (Journals).....	56.35
Mrs. L. E. Knox (Flowers).....	2.50
Weatherford Printing Company.....	17.25
Roberts & Sons (Seal).....	5.65
Dr. E. B. Carmichael (Stamps).....	8.00
Tax on checks (Tarrant American Savings Bank).....	.08
	<hr/>
Total Disbursements.....	\$ 169.02

Cash on hand March 9, 1933_	\$ 1.00	
Checks on hand Mar. 9, 1933	10.00	
		\$ 11.00
Balance on hand March, 1933, Tar-		
rant American Savings Bank.....	256.65	\$ 267.65
		\$ 436.67

(Signed) A. G. OVERTON, Treasurer,
Alabama Academy of Science.

Audited and found correct by Auditing Committee: R. M. Harper, John Xan, W. A. Moore, Chairman.

Report of the Councilor to the A. A. A. S.

Mr. President, Members of the Alabama Academy of Science and Guests:

The Atlantic City meeting of the A. A. A. S., which took place during the last Christmas vacation was quite well attended because of the geographical location of the city. I might say that because of the rain which fell continuously for three of four days of the meetings that Atlantic City was not nearly so nice a place for such meetings as either of the last two Southern cities at which the meetings were held.

First I shall give you a report on the Academy Conference. The Conference was organized about five years ago. The purpose of the organization was to furnish a means by which the affiliated academies might cooperate with one another and with the A. A. A. S. in the improvement of their work. It has been the plan in the past to ascertain the most vital problems of the academies and have a discussion or paper on the subject of the annual meeting. The data is collected from each academy secretary or councilor and thus it is representative of the conditions throughout the 25 states which have academies.

At the New Orleans meeting, Dr. George E. Johnson of the Kansas Academy presented a paper, "Methods to Finance the Work of the Academies." Some of the points which were brought out were as follows:

1. State Academies which have adequately financed their publications have done so through state aid.
2. The securing of endowment funds by the academies furnishes an avenue for securing much needed income.
3. Membership dues should cover more than the ordinary expenses.

Another subject which has been much discussed is the Junior Academy of Science. The Junior Academy is the name applied to the organized alliance between the State Academies and the

high school science clubs. Such an alliance makes it possible to discover and encourage young people who have capacity for later work in science. Also the economic phase of causing or stimulating an individual to become productive at an early age is worthy of consideration.

At the last meeting, we heard a paper by the past president of the Academy Conference, Dr. A. C. Walton, of the Illinois Academy, on "Publication Policies of the State Academies of Science." Dr. Walton listed nine suggestions which would aid in keeping down the cost of academy publications.

Next I shall list a few items of general interest which were discussed at the Council Meeting of the A. A. A. S. at Atlantic City.

1. The membership has dropped from about 19,000 to about 13,000 during the depression.
2. Treasurer's report. I have it for your inspection if you wish.
3. The bars were let down, so to speak, for fellowships in the A. A. A. S. in that all individuals who will have sketches in the next issue of the American Men of Science will be asked to become fellows of the A. A. A. S.

(Signed) E. B. CARMICHAEL, Councilor.

The Report of the Editor of the Journal

Volume IV of the Journal is presented with a feeling of pleasure because of certain of its contents which we shall now discuss briefly.

As featured on the cover we have at last unearthed the minutes of the first three annual meetings of the Academy. The discovery must be credited to our very efficient secretary, Dr. E. B. Carmichael. But, to our surprise, the minutes were found in Birmingham and not in Tuscaloosa. The publication of these minutes gives us a complete published record of all our minutes and of the titles, at least, of all papers presented before our Academy.

Through the splendid co-operation of the officers of the various sections at last year's meeting we secured abstracts of nearly all the papers presented. Nearly half the Journal is devoted to these abstracts. We are indebted to Dr. Walter C. Jones and Mr. George J. Fertig for assistance in abstracting.

We have included a revised list of charter members of the Academy which contains several new names. If other charter members are known they should be reported for record.

Following the action of last year making the Editor the custodian of the records of the Academy I wish to acknowledge the receipt from Dr. J. L. Brakefield, our former secretary, of forty Journals, Transactions, and Proceedings of various state Acad-

emies of Science, and from Dr. E. B. Carmichael, our present secretary, the promise of Volumes I-IX—bound in one volume—of the records of the Alabama Industrial and Scientific Society founded in 1891.

I wish to recommend that committees appointed or other plans put into operation for the current year be reported to the Editor for publication.

In closing may we urge this year the full co-operation of the chairman and secretary of each section and of each member who presents a paper in securing an abstract of each paper for publication.

(Signed) ERNEST VICTOR JONES, Editor.

ABSTRACTS OF PAPERS PRESENTED MARCH 10th and 11th, 1933

THE INCREASING NEEDS FOR POPULARIZING THE NATURAL SCIENCES

The address of the retiring president of the Academy, J. F. Duggar, Alabama Polytechnic Institute.

The civilization of today is based upon science in its manifold aspects. Invention and our dizzy speed in mechanizing industry have brought certain dangers. Among these is the rapid displacement of men by machines. The outcome will be the shortening of the hours of employment. This will bring increased hours and days of leisure.

On the wise utilization of these increasing hours of personal freedom depends the mental and spiritual growth of the individual, and hence our collective social wellbeing and our national security.

In this scientists have a worthwhile task and opportunity. They may increasingly contribute to recreational and cultural ends, by helping the masses to observe more widely and accurately, to appreciate and love all wholesome aspects of nature, and to reach and cherish right conceptions of natural law.

Among the obvious means to these ends is the popularization of some of the most attractive aspects of the natural science. Science avocations should supplement sports, literature, music, and art in the field of recreational activity.

Scientists should assist the Science Clubs in our high schools. Students' collections of birds, or beetles, or plants, or shells, or minerals may develop interests that will abide,—to brighten leisure hours through adult life.

Another step in this direction may well be for this Academy to publicize in popular form the substance of some of the original papers annually presented, by electing an editor in each section.

The subjects essential in education for science are growing to baffling proportions. Colleges may well consider the offering of intensive courses in Latin root words and Greek root words, for the benefit of those students who cannot take systematic training in classical languages.

To keep up with even the general drift in branches of science beyond one's own specialty has become almost impossible. An aid in this direction is the maintenance of General Science clubs, for faculty and advanced students, to supplement the science organizations of narrower scope in the colleges.

SOME EIGHTEENTH CENTURY VITAL STATISTICS.

—Roland M. Harper, University, Alabama.

The systematic collection of vital statistics is a rather recent development, except in a few countries, states and cities. The present study, which goes well back into the 18th century, is based on three publications dealing with the northeastern United States, but all have Alabama connections.

(1) A history of Temple, N.H. (1860), the birthplace of Daniel Pratt, who founded Prattville, Ala., about 100 years ago. Mr. Pratt is mentioned and genealogical records of over 100 families are given.

(2) A genealogy of the Tuttle family, of New England (1833), ancestors of the late Hon. T. H. Aldrich, of Birmingham.

(3) A record of the relatives of T. A. Conran (1891), who visited Claiborne in 1833 and made important contributions to the knowledge of Alabama geology.

In all these genealogies there are about 10% more males than females, which is a little above the usual ratio. The first child in a family is even more likely to be a boy than are later ones. The average age of marriage did not change much from one generation to another, and was around 26 for men and 21 for women.

The number of children born to the average couple has shown a sharp decline in every case, from around eight in the middle of the 18th century to about half that number in the middle of the 19th (and still fewer since).

The average age attained by the heads of families in the two New England genealogies was a little more than the proverbial three-score and ten.

The reasons for the world-wide decline in size of families are rather complex; but one that seems to be very important but has received little attention is the substitution of machinery for muscle. That began earlier in New England than in other parts of the United States, and shrinkage of families was perceptible there before the end of the 18th century. City people get the benefits of machinery much more than country people do, and have smaller families.

The human race seems to be steadily growing weaker, in spite of all the progress of medical science in combating disease; and in modern cities it almost seems as if most families have one or more members who have had surgical operations to get rid of diseased organs that seldom if ever troubled our grandparents. Of course there are exceptions, but science is concerned with generalities and averages rather than with individual cases.

The genealogies show that even 100 years ago the men who worked with their heads, such as teachers, lawyers and doctors generally had smaller families than those who worked with their hands, like farmers and blacksmiths.

 MOUNDVILLE, ALABAMA, CULTURE.

—Dr. Walter B. Jones, State Geologist, University.

The Alabama Museum of Natural History has acquired the Moundville tract of 175 acres through private donation.

The center of the Moundville culture is located on a high level plain, known as University Terrace, between the town of Moundville, Alabama and the Warrior River.

The Museum's field work has been at four sites on the Tennessee River, two on the Chattahoochee, five on the Warrior, and one in the

Mobile area. The culture was a very highly specialized people particularly in the design and finish of objects in clay, stone, shell, bone, and copper. The mounds are of the pyramid type, bases usually square or elongate. There are 34 mounds in the central group at Moundville, 18 composing a hollow square, the rest inside or outside. The tallest is 58.5 feet high.

The mounds belong to the domiciliary or ceremonial class, and are never used for burial. Constructed of clay brought in from surrounding areas. The burials were in the flesh, in pits. 1600 skeletons have been removed by the Museum.

The Moundville culture is prehistoric. No objects show European influence. Camp debris extends to more than 4 feet and disturbed soil 6-10 feet. Extinct species of shells are found. Crowns of teeth have disintegrated. The exact age is unknown but they are certainly the oldest in Alabama.

BIOLOGY

A CYPRESS SWAMP IN THE APPALACHIAN VALLEY.

—Roland M. Harper, University, Alabama.

Of the two species of cypress in eastern North America, one, the pond cypress, seems to be confined to the coastal plain, while the other, the river cypress, extends a short distance into the uplands, particularly along the Tallapoosa, Coosa and Tennessee Rivers.

A colony of perhaps 100 trees of the latter has recently been found in the same valley Birmingham is in, within 40 miles of here, and about 30 miles from any other known locality for that species. (The exact location will not be disclosed at this time, for fear it may prove too great a temptation to vandals who seem to take delight in hastening the disappearance of any species of plant or animal that is rare.)

The larger trees have limbs down to within a few feet of the ground, as if they had grown in an open space, and yet they can hardly have been planted, for they are two or three feet in diameter, and must have been there before there were any white settlers in this part of the state. However, they are not flat-topped as old cypresses usually are, and may have grown faster than we realize. But even if they are younger than supposed, it is difficult to imagine what incentive the early settlers could have had for planting them.

The smaller trees, a foot or so in diameter, have smooth clear trunks, and have evidently grown up in a dense forest, much like that of today. Additional investigation is needed to throw light on the history of this interesting colony, and it is to be hoped that the vandals will not discover it before the botanists complete their studies.

PRELIMINARY STUDIES ON CYSTOCERCOUS CERCARIAE FROM ALABAMA AND GEORGIA.

—Septima Smith, University of Alabama.

A progress report on studies of cystocercous cercariae recently discovered by the author in fresh-water gastropods of the genus *Gomphobasis* in the states of Alabama and Georgia was given.

These parasites are larval trematodes or flatworms generally known as flukes and are unique in that in most cases, unlike other cercariae,

they are precociously mature having both male and female reproductive organs functional. Two of the forms presented were immature.

This type of cercaria has rarely been described only two species being known from Europe, one from China and six previously from North America, none from this region. Two of these new forms had recently been named, namely *Cercaria hodgesiana* Smith, 1932 and *Cercaria melanophora* Smith, 1932. Others present conspicuous differences from forms previously reported and are yet to be fully described. Life-cycle studies are in progress and evidence indicates that fish will prove to be the definitive host.

Lantern slides made from photomicrographs of the living material were shown. In connection with this paper a demonstration of the living cercariae together with their molluscan intermediate host was given.

*EFFECT OF CERTAIN FOODS ON THE pH OF URINE.

—John Xan, Howard College.

A STUDY OF THE EFFECT OF CHEROKEE MINERAL WATER ON INDUCED POLYNEURITIS IN RATS.

—J. K. Lamar, Birmingham-Southern College.

The effect of the ferruginous water from Cherokee Mineral Springs, at Citronelle, Alabama, upon induced polyneuritis in rats, was determined by plotting the weight curves of experimental animals and controls over a period of one year, or until the death of the animals. The experimental animals, supplied with mineral water, uniformly lived longer, were in better health, and showed better weight curves than the controls, fed on the same vitamin-deficient diet, and supplied with tap water and salt mixture. Analyses of the mineral content of the waters used were presented, with a discussion of possible explanations of the results, on the basis of ion content, particularly of Iron, which is present in large quantities, and Arsenic, present in small concentration, in the mineral water used.

THE EFFECT OF EXPERIMENTAL CELL DISORGANIZATION ON THE HEREDITY OF PARAMECIUM.

—P. H. Yancey, Spring Hill College.

Paramecia subjected to high centrifugal force (27,000-32,000 times gravity) undergo various morphological changes, such as vacuolization, the formation of vesicles, spines, twisting of the whole cell, and displacement and fragmentation of the nucleus. Many of these distorted animals were isolated and cultured individually. Some of them lived and divided indefinitely but in no case was there any inheritance or even mechanical handing down of the defects. Before dividing a reorganization of the cell took place by which the defect was removed and normal daughter cells were produced. Although there was some evidence that individuals became adapted to centrifuging, repeated subjection to the treatment of the same culture did not give rise to any racial adaptation.

*No abstract furnished for this paper.

THE EFFECTS OF INOCULATION AND OF VARIOUS FERTILIZER CHEMICALS ON THE DEVELOPMENT OF ROOT NODULES ON THE SPANISH PEANUT PLANT.

—J. F. Duggar, Alabama Polytechnic Institute.

Examinations repeatedly revealed a surprisingly small number of root nodules on Spanish peanut plants growing on a number of farms outside the Peanut Belt and on sandy soils locally assumed as suitable for peanuts. In our field experiments near Auburn, artificial inoculation resulted in tremendous increases in the number of root nodules per plant, when the pure culture employed was one made from nodules on the roots of the peanut plant. This extremely large increase from artificial inoculation held true both for root nodules of all sizes, and also for those classed as large, that is, of at least the size of an average seed of hairy vetch.

Crop yields were also increased by inoculation to a material extent but not in proportion to the increased number of nodules of either class.

Separate applications of muriate of potash, basic slag phosphate, superphosphate, lime, and most of their mixtures generally increased to a moderate extent both nodule numbers and yields of peanuts, when the fertilizers were well mixed with the soil, and especially when an ample supply of nodules was present as the result of artificial inoculation.

On the other hand, the same fertilizers and certain other common chemicals sometimes applied to crops depressed nodule numbers to variable degrees when, in a droughty summer, they were placed in immediate contact with the unhulled seed and hence were later brought into maximum contact with the root systems of the young plants.

Correlation coefficients were calculated both from the data afforded by individual plants regardless of fertilization and separately for the plants from the variously fertilized plots, and also from the data expressing averages for each particular treatment. In general, these coefficients showed rather high and positive relationships between nodule numbers and yields where the conditions were favorable to growth. But such correlation coefficients were reduced to doubtful or negative significance where conditions for growth were highly unfavorable, as in a summer of extreme drought, or where from other causes nodule numbers were extremely small.

It should be emphasized that these results were obtained chiefly on acid, Norfolk soils and entirely outside of the commercial Peanut Belt.

The gain from inoculation probably would not hold with the runner type of peanuts, which on the same soils was found to be rather plentifully and spontaneously stocked with root nodules.

FEEDING RATE OF AMOEBA PROTEUS ON BACTERIA-FREE CHILOMONAS PARAMECIUM.

—Richard A. Fennell, Birmingham-Southern College.

Chilomonas paramecium was cultured in 125 cc flasks containing Mast and Pace's solution made from sodium acetate, ammonium chloride, magnesium sulfate, and dibasic potassium phosphate.

Chilomonas can be cultured for periods of six weeks or longer in

the solution, provided transfers are made of the organisms to a fresh sterile solution every four or five days.

Chilomonads were fed to *Amoeba proteus* and the number of food vacuoles found in fifteen minutes, thirty minutes, one hour and two hour periods were recorded. It was found that the average number of vacuoles found in the first fifteen minutes was five, the following fifteen minutes two, the following thirty minutes nine, the following hour nine, making a total of twenty-five vacuoles formed in two hours. Experiments are being conducted to determine the effect of H-ion concentration and single salts on feeding rate in *Amoeba*.

A STUDY OF THE HISTORY OF THE GERM CELLS IN FOETAL PIGS. (Preliminary Report).

—J. K. Lamar, Birmingham-Southern College.

A summary of the embryological history of the gonads in the Pig was presented, with a description of the technic for obtaining this material for study. Fixation was in Allen's B-15, and special cytological technic was used throughout. A comparison of the standard technics for using Heidenhain's Iron Haematoxylin was made, and a simpler technic was presented, which obviated certain defects of the older methods. This technic involves washing in distilled water, immersion in fresh 2.5% Iron Alum for 15 min., washing for 10 min. in distilled water, staining with 0.5% aqueous Haematoxylin for 15 min., washing for 3-5 min., differentiation in 1% Iron Alum for 1-2 min., and thorough washing in running water for 15 min. Chromosomes stain bluish black, cytoplasm is very little colored, and the stain has been found permanent for two years. Results of the work indicate that the germ cells will follow closely the history of germ cells in the rat, as outlined by G. T. Hargitt, '23. Typical large and small cells have been found, as described by Hargitt for the rat.

THE MORPHOLOGICAL EFFECTS OF EXCESS AMOUNTS OF IODINE ON THE THYROID GLAND OF THE CAT.

—J. L. Brakefield, Fulton Abercrombie, Howard Crane.

Excess amounts were administered in the form of Potassium iodide to cats at long periods of time to study its effects upon the thyroid gland. These experiments showed that the active cells decreased and the colloidal cells increased.

PHYSIOLOGICAL EFFECT OF SOME DERIVATIVES OF FURFURAL.

Harold E. Johnson, Birmingham-Southern College.

The physiological effects of furoic, (pyromucic) acid, L methyl, B-furyl acrylic acid, furfuryl alcohol and furfuryl acetate, were determined in order that some knowledge might be gained as to their usefulness as antiseptics. Sub-cutaneous injections of these respective compounds at the base of the scapula were used on white rats.

Furoic acid injections caused paralysis of the parts adjoining the site of injection, followed by such abnormal symptoms as lethargy, sneezing, nausea and finally paralysis of the respiratory centers. Autopsies indicated a profuse hemorrhage of the lungs and disintegration of tissues

directly in contact with the injected material. Lethal dose, .039 to .0775 per kilogram wt.

Furyl acrylic acid caused copious sneezing, nausea, and finally, stupor. Respiration was increased, however, the animals became normal again in eight or ten hours. A few days following the injection slowly disappeared by erosion. No lethal dose was found.

L, methyl-B furyl-acrylic acid and L, ethyl-B furyl-acrylic acid were alike in their effects, the latter a trifle weaker because of its lesser solubility. Practically the only effect these acids had was to erode the epidermis in a manner similar to that of furyl acrylic acid.

1 cc of a saturated solution of the water insoluble form of furfuryl alcohol was found to kill the animals in a very few hours. Symptoms such as loss of control over voluntary muscles, slobbering of the mouth, secretion of the lacrimal glands, nausea, hic-coughs and finally paralysis and death. Post mortems showed epidermal and muscular disturbances as described above, as well as a darkened blood system.

Furfuryl acetate behaved much like furfuryl alcohol except that it reacted more slowly. Hemorrhages of the lungs took place in all animals and the uteri of females were likewise affected. Lethal dose, 0.5 cc to 2 cc per kg. wt.

RELATION OF THE GLANDS IN INTERNAL SECRETION TO THE FEMALE SEX CYCLE.

—W. E. Prescott, Jr., M.D.

The relation of the glands of internal secretion which both indirectly and directly influence the sex cycle was discussed. Mention was made of the use of some of the hormones in treating disorders of the sex cycle. The pregnancy tests and the test for determination of the sex in the unborn were given.

STUDIES ON NORMAL BLOOD. III. THE RABBIT AND THE GUINEA PIG.

—J. L. Brakefield, Howard College.

Thorough studies of the blood pictures of the normal rabbit and guinea pig were made. It was found that the blood picture was not influenced to any appreciable extent by age and that the male and female presented similar pictures.

CHEMISTRY

SOME NEW ETHERS OF THE ALIPHATIC SERIES.

—B. F. Clark, Birmingham-Southern College.

In connection with another research problem it is necessary to have available samples of all the known ethers of the aliphatic series through those containing the various butyl groups. Since such a complete series is not recorded in the literature, an attempt is being made to make the missing members by means of the Williamson process. This paper described the method of formation, as well as the physical properties of the new ethers. Samples were also shown.

THE DETERMINATION OF THE FINENESS OF POTTERS' FLINT BY SEDIMENTATION METHOD.

—T. N. McVay, University, Alabama.

The means used is the standard method developed by the Waterproof Sandpaper Manufacturers' Association for the measurement of the particle size of abrasive grain. The method is based on Stoke's law and consists of the determination of particle size by measuring the rate of fall of particles in methyl alcohol and also the percentage of different ranges of sizes. This paper is concerned with the application of the above method to the determination of the particle size of potters' flint used in the ceramic industry, in which case the material is not closely sized but is usually ground to pass a 140 mesh sieve. The results show that check determinations can be obtained and that the method is applicable to both research determinations and for plant control.

A STUDY OF THE FUROIN CONDENSATION.

—B. F. Clark, Birmingham-Southern College.

A thorough study of the formation of furoin from furfural has been made with especial reference to the effect of time, amount of catalyst, amount of solvent, and the purity of the furfural. The original method of Fischer has been modified and improved to the point where yields of 75 and 80% are common as compared to 25% reported by Fischer. Difficulties arose in the purification of the crude furoin and a few remarks were made on how this matter was finally solved satisfactorily.

THE PREPARATION OF FURYL-ACRYLIC ACID AND METHYL-FURYL-ACRYLIC ACID.

—B. F. Clark and H. E. Johnson, Birmingham-Southern College.

The previously available methods for the formation of these two acids gave rise to only low yields. These methods have been thoroughly studied and improved to a point where 50-60% yields are common, and the resulting product is of a high degree of purity.

A GLASS ELECTRODE APPARATUS AND ITS APPLICATION IN HYDROGEN-ION MEASUREMENTS.

—James A. Naftel, Alabama Polytechnic Institute.

The influence of the hydrogen-ion concentration or activity in chemical kinetics and equilibria in aqueous systems is well established. The hydrogen (H_2) electrode is the standard method of measurement, while the quinhydrone (QH) electrode has the greater utility. The H_2 and QH electrodes are both limited in their application, especially where there are redox reactions present. The glass electrode has been developed in recent years for an accurate and rapid method of measurement of H-ion concentration and is not affected by oxidizing or reducing substances. The application of the glass electrode is unlimited, within a certain pH range, and has been successfully employed for measurement of pH values in blood, animal tissue, plant juices, various redox systems, mixtures of flour and water, bacteriological media,

soils, and aqueous extracts of various substances.

The glass electrode apparatus described below is a slightly modified form of that used by Kerridge (1) and McInnes and Dole (2). The McInnes-Dole type of electrode was used with certain improvements in the remainder of the apparatus of the Kerridge type. The leads from the potentiometer were carried to the mid poles of a D.P.D.T. switch, two of the end poles being connected to the glass electrode, and the other two to the H₂ or QH electrode.

The accuracy of the glass electrode may be seen below from the pH values of a series of Clark buffer solutions.

Electrode	pH Values of Clark Buffer Solutions					
	Buffer 1	Buffer 2	Buffer 3	Buffer 4	Buffer 5	Buffer 6
Hydrogen	1.17	1.88	3.90	6.00	7.60	9.38
Glass		1.88	3.88	5.98	7.56	9.45
Quinhydrone	1.20	1.87	3.95	6.00	7.70	-----

THE APPLICATION OF THE GLASS ELECTRODE TO A STUDY OF THE QUINHYDRONE ELECTRODE ERROR IN SOILS OF ALABAMA.

—James A. Naftel, Alabama Polytechnic Institute.

The quinhydrone (QH) electrode has been used universally by soil chemists for the measurement of soil reaction. In certain soils unstable potentials and erroneous pH values are obtained with the QH electrode, and another method of measurement must be used. The glass electrode has been shown to be highly accurate in solutions where the other standard methods are not applicable. Earlier work has shown that the QH pH values are generally higher than the glass or hydrogen (H₂) values, and the latter two values are in good agreement. The variation between the glass, or H₂, values and the QH pH values is termed the "QH error". This error, its magnitude, and cause is not easily determined when the QH electrode is used alone.

The QH error has been studied previously but all of the findings have been discredited or included in the study by Heintze and Crowther (1). They concluded that Mn in certain forms was reduced by the HQ of the dissociated QH molecule forming a base, Mn(OH)₂, which neutralized a portion of the soil acids. Their work was not entirely conclusive due to the lack of an independent method.

The present investigation was conducted on various soils as follows:

1. The pH value was determined by means of the glass electrode, and then an excess of QH was added to the sample, the suspension shaken 15 seconds, and the pH value again measured with the glass electrode. This gave values by which the magnitude of the QH error due to the actual change in H-ion concentration of the soil suspension was measured. The simultaneous measurement with the QH electrode may show a slight variation from that of the second glass value. This variation is due to a change in the Q/HQ ratio.
2. Chemical analyses of the resulting soil suspension were made to determine the Q/HQ ratio, and the Mn made exchangeable.

Results of this study show that some soils have a large QH error while others do not. The results obtained with the glass electrode show that insoluble Mn is the chief source of the "QH error" in the solids.

*PREPARATION OF NEW HYRAZONES OF HYDRAZINE HYDRATE.

—John Xan, Howard College.

APPARATUS FOR THE DETERMINATION OF IODINE IN FOODS.

—B. F. Clark and C. H. Winfield, Birmingham-Southern College.

The apparatus to be used in a survey of the iodine content of foods in Alabama was exhibited and its operation described. This apparatus is similar to that of Remington and was not modified appreciably from his original design, but because of its novel features, its discussion seemed justified.

THE DETERMINATION OF LEAD IN ALLOYS.

—James L. Kassner, University of Alabama.

The alloy is dissolved in a mixture of nitric and hydrofluoric acids, the acidity adjusted and the lead precipitated by the addition of a dichromate. The lead chromate is filtered on an asbestos mat, washed with hot water, dissolved in a hot solution of sodium chloride containing a small amount of HCl. The chromate is reduced by adding an excess of standard arsenite, more concentrated HCl, and then the excess arsenious acid is titrated while hot with standard bromate, using methyl orange as indicator. The end point is sharp although a little slow. The end point may also be determined electrometrically with the Wendt or Kassner electrometric titration apparatus.

All alloys containing a small amount of tin and relatively low in lead may be dissolved in Pyrex beakers without vitiating the results, but alloys high in tin or lead must be dissolved in platinum or bakelite beakers. It is important to keep the concentration of H_2F_2 as low as possible because lead fluoride is relatively insoluble.

This method has been applied to alloys obtained from the Bureau of Standards and very good results obtained in all cases. In conclusion this method is easier to carry out, more accurate and more rapid than the usual sulfate separation. A determination can be completed in about forty-five minutes. Its advantages are greatest in the case of alloys containing a large amount of tin and antimony, where the sulfate separation of lead gives impure precipitates.

SOME QUANTITATIVE STUDIES OF THE LOCALIZATION OF URANIUM IN THE PRINCIPAL ORGANS OF RABBITS DURING THE COURSE OF URANIUM INTOXICATION BY USE OF THE MAGNETO-OPTIC METHOD.

—Herman D. Jones, and Roy Goslin, with the assistance of Keith D. Crane and G. B. Johnson, Alabama Polytechnic Institute.

Known quantitatives of uranium nitrate were injected subcutaneously into the abdominal walls of fasted rabbits and the quantities of uranium found in the various organs of the body, blood and urine were then determined quantitatively at definite intervals from one hour to twenty-four hours.

*No abstract furnished for this paper.

The following summary was made from the results obtained,

1. The Magneto-optic method has been used advantageously and successfully in the quantitative determination of uranium in the blood, urine, and organs of these animals.
2. Uranium was found in the blood, urine, kidney, spleen, and liver, and the results are tabulated.
3. No uranium was found in the bile or gall bladder.
4. No other tissue was examined.
5. An average of 20% of the total uranium was found in the liver. The maximum was 50% and the minimum was 11% for a period of twenty-four hours.
6. An average of 23% of the total uranium was found in the kidneys. The maximum was 39% and the minimum was 6.23% for a like period.
7. The Uranium is excreted through the kidney during the first twenty-four hours and not through the bile.
8. None of the metal was found in the tissues examined from the animal which was not injected with the uranium solution.

*THE OLEORESINS OF CAPSICUM

—George J. Fertig, Birmingham.

A STUDY OF THE EFFECT OF RECRYSTALLIZATION OF REAGENT QUALITY CHEMICALS ON pH VALUES OF STANDARD BUFFER SOLUTIONS.

—J. L. Kassner, University of Alabama.

Standard buffer solutions were prepared according to Clark and Lubs, using carbonate free HCl and NaOH and Mallinckrodt's reagent quality chemicals. Four sets of buffer solutions were prepared from the following chemicals: potassium chloride, potassium acid phthalate, potassium dihydrogen phosphate, and boric acid. The first was prepared from the salts as they came from the factory; the second, third and fourth solutions were prepared after the salts had been recrystallized one, two and three times respectively.

The pH values of all four solutions prepared from each chemical agreed very well with the values given by Clark and Lubs. Most of the results obtained with the original salts did not vary from the theoretical value by more than 0.03 pH, and recrystallization improved the value slightly in all cases.

A mould begins to grow in most of these solutions after a short time, changing the pH of the solution. Two more sets of buffered solutions were prepared, the first with water saturated with chloroform and the second with water saturated with calomel. The pH values of all the solutions prepared with water that had been saturated either with calomel or chloroform agreed with the pH values of the solutions prepared with the untreated water to within 0.01 or 0.02 of a pH.

At present not enough work has been done on the sterilization of buffer solutions to allow any definite conclusions. This problem will be extended to include the study of buffer solutions prepared with chemicals from other sources. Other methods of sterilization will also be studied.

*No abstract furnished for this paper.

SOME SCHIFF BASES PREPARED FROM FURFURAL.

—B. F. Clark and T. D. Farr, Birmingham-Southern College.

Several new Schiff bases have been made, using furfural instead of benzaldehyde. Samples of these bases were exhibited, their mode of formation and their properties described. These materials offer some difficulty in the diazotization process and the method used in making dyes from these bases was described.

PREPARATION OF SELENIUM ORGANIC COMPOUNDS.

—By George D. Palmer, Jr., and S. J. Lloyd, University of Alabama.

A new process for the preparation of selenium organic compounds from simple organic compounds and selenium with the production of hydrogen selenide has been discovered. This process is analogous to one in which the authors produced sulfur organic compounds [J.A.C.S. 52 3388 (1930)].

The process consists in vaporizing or dropping an organic substance, such as benzene or aniline, into molten selenium. Selenium organic compounds have been prepared, purified by extraction with solvents, and analyzed for selenium.

RECENT DEVELOPMENTS IN SLAG GLASS.

—C. A. Basore, Alabama Polytechnic Institute.

This article includes a brief discussion of the economic and technical advantages of slag for glass making, and briefly mentions some of the recently discovered properties of the slag glass. Several new slag glasses are briefly discussed. These include a semi-transparent glass which might be substituted for opal glass now used for doors and windows of offices, factories and lavatories, a chemical glass which is quite inexpensive and which compares very favorably with many of the leading laboratory glasses, and a white opaque glass suitable for various purposes.

GEOLOGY AND ARCHAEOLOGY

THE ABORIGINAL OCCUPATION OF ALABAMA.

—Walter B. Jones, State Geologist, University.

The first occupants of Alabama were the pre-Indian Mound Builders and later the Indian.

The Mound Builders certainly built the great truncated pyramids. These were along water courses indicating that travel was by water. Therefore, the entrance to Alabama must have been by Mobile Bay and the Alabama River. The author believes they came from Central America.

The earliest Mound Builders in organized town life were in the Bottle Creek area of the Mobile Delta and at Moundville. The former is probably the older.

Some of the various cultures represented in the Mound Builders may have existed simultaneously in the various areas. The author believes the various cultures had largely disappeared before the coming

of the so-called Red Indians. There is much evidence to support the migration of the Indian from a region centering around southern Ohio. The author believes that these old southern Mound Builders, in the person of the Indian of history, wandered northward in search of more fertile lands and better hunting and fishing, and finally returned, after a long period during which there was little or no occupation down here.

THE USE OF INSOLUBLE RESIDUES IN SUB-SURFACE CORRELATION.

—T. G. Andrews, Department of Geology, University of Alabama.

Insoluble residues, prepared from non-fossiliferous limestones, may be used in sub-surface correlative work. A simple method of preparation of the insoluble residues is used, and the mass characteristics of the residues form the bases for the correlations made. The method has been successfully used in Missouri and Tennessee.

REGIONAL DEVOLATILIZATION OF ALABAMA COALS.

—C. S. Blair, Geologist, T. C. I., Birmingham.

Variations in the volatile content of our Alabama coals noted with corresponding changes in physical structure and coking qualities. Compares structural conditions of the various fields and the relationship, if any, to the degree of devolatilization, indicated on maps by isocarbs for each field based on surface analyses of the coal seams. In Warrior Field on structural cross sections, analyses are shown from drilling of beds at progressive depths below the surface, the carbon content increasing with depth, corresponding roughly with the Law of Hilt or one degree in 200 feet. The surface analyses show no increased carbon in the steep dipping strata bordering boundary faults compared to those in adjacent low dipping strata while the Cahaba and Coosa Fields with greater degree of folding and faulting, have higher volatile content than the eastern portion of the Warrior Field.

Probable causes of regional devolatilization discussed, which cannot be satisfactorily explained by the theory of horizontal pressure advanced by David White. The principal factor considered to be the pressure of overlying beds through geologic periods, the variations in the same field being due in large degree to the varying average thickness of such overlying strata. Our coal fields probably originally one continuous field, deposited in a gradually sinking basin with progressive deposition of the higher beds and the greatest thickness of strata towards the center of the basin, located possibly near the east border of Warrior Field. By post-Permian overthrusts, the cover over the eastern margin of the Warrior and in Lookout Mountain Fields, the areas of lowest volatile coal, probably increased to mountainous conditions, largely since removed by erosion.

The pressure of such overlying strata of varying thickness, applying through geologic periods, considered principal cause of existing regional variations in devolatilization in our Alabama coal fields.

SOME REPRESENTATIVE FOSSILS OF THE CRETACEOUS-EOCENE CONTACT IN ALABAMA.

—Winnie McGlamery, Geological Survey of Alabama, University.

The contrast between the faunas in the beds just below and immediately above the Cretaceous-Eocene contact was pointed out by showing a number of fossils from each, including Foraminifera. The interpretation of this difference is that a long period of time elapsed between the closing of the Cretaceous and the introduction of the Eocene, that certain genera became extinct with the close of the Cretaceous in the Gulf Coastal Plain, and new species were evolved from those that persisted, also that a small number of new genera, from outside provinces, appeared in the basal Eocene.

Localities in the state cited as good exposures of the Cretaceous-Eocene contact are:

- (1) One and one-half miles east of Clayton, Alabama, at a cut in the Central of Georgia Railway.
- (2) Old Canton Landing, Wilcox County, Alabama River, Alabama.
- (3) Moscow Landing, Tombigbee River, Alabama, about fourteen miles below Demopolis.
- (4) Curles station road southwest of Livingston, Alabama, half a mile southwest of the Courthouse and just west of Sucarnochee Creek

INDUSTRY

*AIR CONDITIONING.

—T. L. Bissell, Alabama Power Company, Birmingham.

*THE ADVENT OF AIR CONDITIONING IN THE HOME.

—E. A. Hawk, T. C. I., Birmingham.

GRAVITY CONCENTRATION OF RED IRON ORES.

—B. W. Gandrud, U. S. Bureau of Mines Station, University.

"It is probable that in the near future there will be an urgent demand for a satisfactory method of concentrating the Alabama Red Iron Ores. Concentration of iron ores is the process whereby impurities and waste material in the ore is eliminated to some extent before the ores are smelted in the blast furnaces. Elimination of impurities automatically raises the percentage of iron in the ore thereby improving the grade of the ore and making it a more satisfactory blast furnace feed. Iron ores in the Birmingham district are low-grade in comparison with Northern ores, but they are usually self-fluxing so that it is not necessary to add a flux such as limestone to the blast furnace. These self-fluxing ores are being depleted, however, and it will some day be necessary to use the siliceous ores. When this happens, part of the silica must either be removed by a concentration process or a large amount of flux will have to be combined with the ore as it is fed to the blast furnace. The latter procedure would probably add so much to the cost of making pig iron as to be prohibitive.

"The Southern Experiment Station of the U. S. Bureau of Mines is working out a process of concentration which it is believed should ultimately be of practical value."

*No abstract furnished for this paper.

THE HEAT POLYMERIZATION OF TUNG OIL.

—E. V. Jones, Birmingham-Southern College.

A brief historical survey of the tung oil industry in China and its present status in the South was given. Tung oil ranked fourth among our chemical imports. Current ideas of the composition of T. O. and present methods of testing were reviewed briefly.

The experimental phases of the paper dealt with the polymerization of tung oil on heating with special reference to the relation of oxidation to polymerization. The various explanations of polymerization were mentioned.

The oil was heated to 220 degrees C. and its polymerization followed by its refractive index which had a constant value of $N_{25} = 1.5100$ at gelation.

In a similar manner the effects of bubbling oxygen, carbon dioxide and hydrogen sulfide through the oil were studied.

Bubbling O_2 , and the rate of bubbling (20 to 120 per min.) hastened gelation somewhat and seemed to increase N slightly.

Bubbling CO_2 delayed gelation somewhat and seemed to increase N slightly.

Bubbling H_2S delayed gelation considerably and greatly decreased N .

Two preliminary tests showed almost identical effects of bubbling gases on weight of samples.— O_2 caused a slight increase, CO_2 a very slight decrease, H_2S a relatively large decrease.

*UTILIZATION OF METALLURGICAL WASTES.

—C. A. Basore, Alabama Polytechnic Institute.

*SOME SLACK TIME RESEARCH.

—Ray L. Farabee, University of Alabama.

*TECHNOCRACY.

—J. M. Gallalee, University of Alabama.

MATHEMATICS AND PHYSICS

AN INTEGRATION PROBLEM INVOLVING A NEW TRIGONOMETRIC SUMMATION.

—W. A. Moore, Birmingham-Southern College.

$$\text{The Summation, } \sum_{k=1}^n K \sin (2k - 1) \frac{m \pi}{n} = \frac{-n}{2 \sin \frac{m \pi}{n}}$$

m and n integers $n > m > 0$, was presented at a former meeting of the Academy.

I now propose to show that by the use of this summation a proof by elementary methods can be obtained for the formula:

*No abstract furnished for this paper.

$$\int_0^{\infty} \frac{x^{2m-1}}{1+x^{2n}} dx = \frac{\pi}{2n \sin \frac{m\pi}{n}}$$

In order to separate into partial fractions, I find the roots of $1+x^{2n}=0$ to be $\alpha_k = e^{\frac{1}{2n}(2k-1)\pi i}$ and their reciprocals

$$\beta_k = e^{-\frac{1}{2n}(2k-1)\pi i} \quad k = 1, 2, 3, \dots, n.$$

The partial fractions are

$$\frac{x^{2m-1}}{1+x^{2n}} = \sum_{k=1}^n \left(\frac{\frac{2m-2p}{\alpha_k}}{2n(x-\alpha_k)} + \frac{\frac{2n-2m}{\alpha_k}}{2n \left(x - \frac{1}{\alpha_k} \right)} \right) \text{ which gives}$$

$$\frac{x^{2m-1}}{1+x^{2n}} = \frac{1}{2n} \sum_{k=1}^n \frac{C_k x - E_k}{D_k}$$

$$\text{where } C_k = -2 \cos(2k-1) \frac{m\pi}{n}$$

$$E_k = -2 \cos(2k-1) (2m-1) \frac{\pi}{2n}$$

$$D_k = x^2 - 2x \cos(2k-1) \frac{\pi}{2n} + 1$$

Finally by the use of the summation first mentioned the definite integral can be evaluated.

AN INTERESTING FUNCTION FROM ELEMENTARY CALCULUS.

—William Sell, University of Alabama.

The indefinite integral of the n th power of x is considered as a function of the variable n . The point of discontinuity when $n = -1$ is considered, and the usual definition for this value is found to be consistent.

A SIMPLE SOLUTION OF THE QUARTIC EQUATION.

—George W. Hess, Howard College.

When the quartic has been reduced to the form (1), $x^4 + bx^2 + 2cx + d = 0$, the auxiliary cubic, (2) $16t^3 + 8bt^2 + (b^2 - 4d)t - c^2$

= 0 has at least one positive root. If m denotes the positive square root of any positive value of root t . Then $x^4 + bx^2 + 2cx + d =$

$$(x^2 - 2mx + 2m^2 + \frac{b}{2} + \frac{c}{2m}) (x^2 + 2mx + 2m^2 + \frac{b}{2} - \frac{c}{2m}), \text{ and}$$

the solution of the quartic is thus reduced to the solution of two quadratic equations.

ON THE INTERPRETATION OF THE RESULTS OF THE
"MAGNETO-OPTIC" EXPERIMENTS AS SHOWING A
TIME LAG FOR THE FARADAY EFFECT.

—W. N. Arnquist, Alabama Polytechnic Institute.

Assuming a time lag for the Faraday effect which is small in comparison to the total time during which the substance is active in rotating the plane of polarization after it has been made active by a transient magnetic field, an analysis of the circuit used in the "magneto-optic" method is made. The results show that minima and maxima should be observed in accordance with experiment. Some quantitative discrepancies are discussed and some indications for the improvement of the minima are obtained.

POLARITY OF MAGNETIC IRON OXIDE.

—C. S. Whittet, Birmingham.

Specimens of magnetic iron oxide formed on hot or molten iron are found to exhibit magnetic polarity. The powdered scale is attracted by a permanent magnet but in an alternating field it vibrates, indicating the existence of crystals with definite poles.

QUASI REGULAR POLYHEDRONS.

—William Sell, University of Alabama.

A solid bounded only by warped polygons each having the same number of sides, with a constant number of such polygons belonging to any vertex, is called a quasi regular polyhedron. These solids are classified as to number of sides. If the surface is of genus zero, these correspond to the Platonic solids.

MEDICINE

*PHASES IN THE DEVELOPMENT OF BLOOD TRANSFUSION. (LANTERN.)

—James M. Mason, M.D., Birmingham.

*BONE GROWTH AS A RESULT OF STIMULATION.

—E. W. Patton, D.D.S.

*BURNS.

—R. W. Waldrop, M.D., Bessemer.

*No abstract furnished for this paper.

*ELLIPTICAL RED BLOOD CELLS IN MAN. (LANTERN.)
—Sarah H. McCarty, Birmingham.

*FOCAL INFECTIONS IN INFANTS.
—W. S. Wilson, D.D.S., Fairfield.

*FOOD POISONING DUE TO STAPHYLOCOCCI.
—Ralph McBurney, M.D., University of Alabama.

*FRACTURES OF THE SPINE.
—Earle H. Conwell, M.D., Fairfield.

*No abstract furnished for this paper.

DIRECT OBSERVATION OF THE CONTRACTION OF THE
GALL BLADDER IN THE OPOSSUM.

—Franklin S. DuBois, M.D., and Gene H. Kistler, M.D., University of Alabama.

Contraction of the gall bladder in the opossum has been consistently obtained by stimulating the surface of the vesicle with a faradic current. When such a stimulus is applied to the corpus or fundus, a localized shallow constriction appears. Frequently there are small rounded protuberances in the wall. As expulsion of bile occurs, the transparent wall becomes bleached, opaque, and eventually puckered. Repeated electrical stimulation may result in complete emptying of the viscus.

After the common bile duct has been severed at its upper end—to eliminate any possible evacuating action of peristalsis of the duct—stimulation of the gall bladder causes as great a discharge of cystic bile as before. During such periods of contraction, increase of intravesicular pressure—as measured by a manometer of 1 mm. bore connected to the cystic duct—registers as high as 15 to 40 mm. of water.

Stimulation of that portion of the gall bladder adjacent to the liver produces little alteration in the appearance of the wall of the vesicle and no change in intravesicular pressure. Serial sections of the gall bladder, fixed in 10% formalin during the height of contraction, demonstrate that the smooth muscle layer is thicker in the peritoneal than in the hepatic portion of the gall bladder wall.

THE DIFFERENTIATION OF THE MESECTODERM AND
MESENTODERM OF THE EARLY CHICK BLASTODERM
IN CHORIO-ALLANTOIC GRAFTS.

—Thomas E. Hunt, University of Alabama.

Chorio-allantoic grafts were obtained from transplants of the mesectoderm and mesentoderm of the area pellucida of chick blastoderms in the definitive primitive streak stage. From sixty-four transplants of

the entire mesentoderm only eight grafts were obtained. In these grafts the only differentiation was that of a gut-like epithelium occurring in the form of small tubes or as a flat layer on the surface of the grafts the only differentiation was that of a gut-like epithelium occurring forty-three grafts were obtained. Grafts either of the entire mesectoderm or of the anterior half of it containing the node show a development of notochord, brain, ganglia, eye, epiphysis, heart, mesonephros, skeletal muscle, cartilage, membrane bone, skin, feather germ and also, most surprisingly, gut, thyroid and liver. Gut, with fibrous and muscular tunics, appears in practically every graft and thyroid and liver are present in three cases. Gut also occurs in twelve of fifteen grafts of the posterior half of the mesectoderm and in seven of eight grafts of the mesectoderm lateral to the primitive streak.

*OBSERVATIONS ON LOCALIZATION OF CENTRAL, VASOTONIC IMPULSES.

—W. K. Hare, University.

MORPHOLOGIC CHANGES IN THE STOMACH AND BOWEL PRODUCED BY INTRAMURAL INJECTIONS OF BARBITURATES. (LANTERN SLIDES.)

—Gene H. Kistler, M.D., University of Alabama.

The occurrence of inadvertent bowel wall puncture following intraperitoneal barbiturates has been frequent in the relatively few animals examined. Injury by a needle thrust into the lumen heals readily without noteworthy gross changes, but injections of nembutal into the bowel have produced changes ranging from a small subserosal hemorrhage to a large ulcer of the lining. Necrosis of the mucosa has been observed within a few hours. In one dog given nembutal intraperitoneally six days previous to termination there was a penetrating jejunal ulcer 0.3 by 0.7 cm. surrounded by an elevated and indurated margin 0.2 to 0.4 cm. wide. Opposite this defect was an organizing subserosal hematoma.

These observations have been corroborated by 0.25 cc. submucosal and subserosal injections into the stomach and bowel of dial and nembutal and the sodium salts of barbital, amytal, and nembutal in sterile 10 percent solutions. In submucosal injections superficial mucosa necrosis occurred within an hour. The maximum change attained in 24 to 48 hours usually consisted of a mucosal slough extending to the muscularis with little reaction about it. Following subserosal injections a deeper defect opposite a subserosal hematoma occurred. Observations have been made up to 8 days after injections, at which time there is rarely more than a very small mucosal defect and a shrunken subserosal hematoma. Distilled water, 0.9 percent sodium chloride and 5 percent glucose produced only a slight and transient extravasation of blood in the tissues, presumably due to distension by the fluid.

Insufficient data invalidates any conclusions at this time, but it is clearly indicated that the gastro-intestinal tract may be punctured by intraperitoneal injection; that intramural injection of some barbiturates into the bowel and stomach causes necrosis and that, although there is a distinct tendency for these lesions to heal, perforation of the wall is not inconceivable.

*No abstract furnished for this paper.

*NUTRITION AND ITS RELATION TO CALCIUM METABOLISM.

—George W. Matthews, D.D.S., Birmingham.

*AN ATTEMPT TO IMITATE PREGNANCY TESTS BY MEANS OF DRUGS.

—Marie C. D'Amour, University of Alabama.

*PNEUMONIA FATALITIES AND OCCUPATIONS.

—C. H. Kibbey, M.D., Fairfield.

*MANIFESTATIONS OF PREMATURE OLD AGE IN AMERICANS.

—Henry R. Carter, M.D., Birmingham.

*RABIES IN DOG AND MAN WITH SPECIAL REFERENCE TO IMMUNIZATION OF DOGS.

—D. A. Piatt, M.D.C., V.S., Birmingham.

ON THE ACTION OF RATTLESNAKE VENOM UPON RESPIRATION.

—Louis C. Posey and Emmett B. Carmichael, University of Alabama.

Rattlesnake venom has been injected into guinea pigs and the subsequent effect upon the rate of respiration observed. It has been found that the venom acts on the peripheries of afferent nerve in such a way that an immediate and marked increase in the respiration rate is produced. When the venom is injected intraperitoneally the vagal nerves seem to conduct the major part of the stimulating impulses. This is evidenced by the fact that intraperitoneal injections of venom into animals with sectioned vagi fail to produce the same percentile increase of respiration as that in normal animals.

Intraperitoneal injection of venom into animals with sectioned vagi and spinal cord does not cause an increase in respiratory frequency, but instead the rate remains rather constant with a gradual decline and ending in a failure of the respiratory mechanism.

When venom is injected into the large intestine the respiratory rate is not altered. And since these animals lived and maintained their normal weight, it seems that a sufficient amount of the venom injected to produce changes in the respiratory rate is not absorbed from the large intestine.

There is some change in the tissues exposed to the action of the venom, for a subsequent injection by the same route does not initiate an increase in the respiratory rate.

If the venom acts first on the centers controlling respiration, as is the case after making the injections into the carotid artery, the symptoms of depression or failure of these centers are produced. Thus in such an experiment there is an initial apnoea which is followed by a Cheyne-Stokes-like breathing and death from respiratory failure.

*THE ACTION OF RADIUM ON NORMAL AND MALIGNANT TISSUE CELLS. (Moving Pictures.)

—M. Y. Dabney, M.D., Birmingham.

EXPERIMENTAL STUDIES ON THE POSSIBLE POISONOUS PROPERTIES OF THE SPIDER, *LATRODECTUS MACTANS*.

—A. W. Blair, University of Alabama.

The spider, *Latrodectus mactans*, is common in the South. Physicians and laymen consider its bite poisonous, though rarely fatal, to man. Arachnidologists, in general, have been sceptical. The objective and subjective symptoms in man following the bite of this spider are severe and closely simulate certain acute abdominal emergencies. Experimental studies are fragmentary and contradictory. A series of experimental studies have been in progress for the past six months in an attempt to, first, definitely prove or disprove any poisonous effects which its bite may produce in a series of laboratory animals and, secondly, if poisonous, to determine the manner in which such an effect is produced.

Summary of findings to date:

(1) Adult females of the genus *Latrodectus mactans* are much more numerous than males.

(2) Adult white mice, white rats, and guinea pigs show definite local and characteristic general toxic reactions following the bite of the female *Latrodectus mactans*.

(3) The most severe and uniform results were obtained when the spider bit the penis or scrotum.

(4) The objective symptoms observed following the bite were in the order of their appearance (1) evidence of pain when spider bit, (2) hemorrhagic extravasation at site of bite followed by local oedema, (3) restlessness and licking of site of bite, (4) irregular respiration, (5) excessive lacrymation, (6) semi-comatose condition, (7) marked muscular incoordination.

(5) In a certain proportion of the animals, thus bitten, death results.

(6) The bite of the male *Latrodectus mactans* produces in adult white mice the same results as that of the female.

(7) Mice which have recovered from the effects of the bite show slight local and no general toxic symptoms to further bites.

(8) One spider is capable of producing toxic general symptoms in rapid successive bites on different animals.

(9) Gross findings at autopsy, apart from the local lesion, have been essentially negative.

(10) Subcutaneous, intraperitoneal and intravenous injections of saline or watery emulsions and filtrates of the whole spider, the abdomen alone, the cephalo-thorax alone or poison glands in the mouse, rat, guinea pig and rabbit have been negative.

*THE GROWTH CHARACTERISTIC OF TUMOR CELLS IN SEROUS FLUIDS. (LANTERN.)

—George S. Graham, M.D., Birmingham.

*ULCERATION IN THE DIGESTIVE TRACT AND DISTURBANCES IN DIGESTION FOLLOWING EXPERIMENTAL LESIONS IN THE BRAIN STEM. (LANTERN.)

—A. D. Keller, W. K. Hare, and Marie C. D'Amour, University of Alabama.

*SOME EXPERIMENTAL STUDIES ON THE VAGUS NERVE. (LANTERN.)

—James O. Foley, and Franklin S. DuBois, M.D., University of Alabama.

*No abstract furnished for this paper.

PROGRAM OF THE ALABAMA JUNIOR ACADEMY OF SCIENCE

SATURDAY, MARCH 11, 1933

BIRMINGHAM-SOUTHERN COLLEGE

Science Hall, Room No. 37

Opening remarks by Dr. John R. Sampey, Chairman of Committee on Organization of a Junior Academy.

Dr. Emmett B. Carmichael, Secretary and Councilor to A. A. A. S., The Junior Academy Movement.

Dr. Roger W. Allen, Alabama Polytechnic Institute, "The Chemist and His Molecules."

Business Session: Election of Officers by authorized delegates from the several clubs.

Scientific Session: Newly elected President presiding.

Papers limited to 10 minutes; discussion, 5 minutes.

1. Brooks Bishop, Woodlawn High School (Edisonian Club), Photomicrographic Study in Biology and Crystallography.
2. Bernice Franke, Shades-Cahaba High School, The Ant Family.
3. Mescal Hare, Mortimer Jordan High School, Searching for Furfural in the Pine Tree and its Products.
4. Winthrope Hubler, Ensley High School, Some Observations with a Microscope.
5. George Moore, Auburn High School, Reptiles in Alabama.
6. Robert Newman, Fairfield High School, Amateur Study of Butterflies and Moths.
7. Conrad Parrish, Jr., West End High School, The Value of Wind Tunnels to Aeronautics.
8. Thomas Pettee, Phillips High School, Airplane Design.
9. Louis Roberts, Ramsay Technical High School, The Microscope: Its Construction and Its Adaptation to Modern Science.
10. Franklin Rook, Woodlawn High School (Utopian Club), Latest Developments in World Communications.
11. Agee Melvin and Charles Chisolm, Selma High School, Evolution of a Home Made Science Laboratory of Two High School Boys.

Appointment of Committees.

Adjournment and Inspection of Exhibits, Science Hall, Room No. 22.

**CHARTER CHAPTERS OF THE ALABAMA JUNIOR
ACADEMY OF SCIENCE**

Auburn High School Science Club.....	Auburn, Ala.
Bishop Toelen High School Science Club.....	Mobile, Ala.
Convent of Mercy Science Club.....	Mobile, Ala.
Ensley High School Science Club.....	Ensley, Ala.
Fairfield High School Science Club.....	Fairfield, Ala.
Minor High School Science Club.....	Ensley, Ala.
Mortimer Jordan High School Science Club.....	Morris, Ala.
Murphy High School Science Club.....	Mobile, Ala.
Phillips High School Science Club.....	Birmingham, Ala.
Ramsay Technical High School Science Club.....	Birmingham, Ala.
Selma High School Science Club.....	Selma, Ala.
Shades-Cahaba High School Science Club.....	Birmingham, Ala.
Spring Hill High School Science Club.....	Spring Hill, Ala.
University Military Academy Science Club.....	Mobile, Ala.
Visitation Academy Science Club.....	Mobile, Ala.
West End High School Science Club.....	Birmingham, Ala.
Woodlawn High School Science Club.....	Birmingham, Ala.

**AUTHORIZED DELEGATES TO THE FIRST ANNUAL
MEETING OF THE ALABAMA JUNIOR ACADEMY
OF SCIENCE**

John Adams.....	Phillips High School
Mary Nell Collins.....	Woodlawn High School
Wayne Collins.....	Fairfield High School
John Colmant.....	Ramsay High School
Garland Goodwin.....	Shades-Cahaba High School
Mescal Hare.....	Mortimer Jordan High School
Winthrope Hubler.....	Ensley High School
Agee Melvin.....	Selma High School
George Moore.....	Auburn High School
Roy Sizemore.....	Woodlawn High School
Ralph Waldrop.....	West End High School

OFFICERS OF THE JUNIOR ACADEMY—1933-1934

President—W. R. Hubler.....	Ensley High School
	Birmingham, Alabama.
Vice-President—Robert E. Chambers.....	Woodlawn High School
	Birmingham, Alabama.
Secretary—Stella Beard.....	West End High School
	Birmingham, Alabama.

CONSTITUTION OF THE ALABAMA JUNIOR ACADEMY OF SCIENCE

Article I—Name

This organization shall be known as the Alabama Junior Academy of Science.

Article II—Purpose

The purpose of the Junior Academy shall be the encouragement of scientific work and study among high school students in the State of Alabama, by cooperating with the Alabama Academy of Science.

Article III—Membership

Section 1—Membership. The membership of the Junior Academy shall consist of the members of the chapters of the Junior Academy who are in good standing with their respective chapters.

Section 2.—Chapters. Each chapter shall consist of the sponsor from the science faculty of a high school together with such students in the school as have met the requirements for membership as laid down in the constitution of that chapter.

Section 3—Application. Science clubs interested in becoming affiliated with the Junior Academy should submit to the Secretary of the Alabama Academy of Science or some member of that body an application accompanied with a list of the club members and a copy of the constitution or constitutions composing that chapter. Applications will be received from any senior high school in the state which is doing at least eleventh grade work. The application will be passed upon by the councilors and officers of the Junior Academy, and election to membership will be made at the next annual meeting.

Section 4—Limitation. Each high school shall be limited to one chapter, regardless of the number of science clubs in the school.

Article IV—Officers

Section 1—Officers. The officers of the Junior Academy shall consist of a President, a Vice-President, a Secretary and a Treasurer. These officers shall be elected by the delegates from the several chapters represented at the regular annual meetings of the organization. Candidates for office shall be limited to students who shall be bona fide members of a high school at the next annual meeting.

Section 2—Duties. The above officers shall perform the duties usually pertaining to their respective offices, and in addition give their full cooperation to the councilors appointed from the Alabama Academy of Science.

Article V—Dues

Each chapter shall pay to the Junior Academy an annual fee of one dollar. The initial fee of one dollar shall include the cost of a charter, and constitute the first year's dues. Any chapter in arrears in dues for two years and failing to respond to notification from the Treasurer shall be dropped from the Junior Academy and its charter revoked.

Article VI—Delegates

Each chapter shall be limited to one delegate at the annual meet-

ing. Only the official delegates of the various chapters shall vote on the matters representing the official business of the organization.

Article VII—Limitations of Expenses

No bills in excess of five dollars shall be incurred by the Junior Academy without the authorization of the Treasurer of the Alabama Academy of Science.

Article VIII—Bills

No bills against the Junior Academy shall be paid without an order endorsed by the President and Treasurer of the Junior Academy. Books will be audited once a year by a committee from the Alabama Academy of Science.

Article IX—Meetings

The Junior Academy shall have an annual meeting with the Alabama Academy of Science at such time and place as that organization shall designate. Local chapter meetings shall be determined by the individual chapters. Additional meetings of any appropriate group of chapters may be held at any time.

Article X—Ratification

This Constitution shall become effective at such time as it is ratified by a majority of the chapters in membership by February 1, 1934, and subject to the approval of the Alabama Academy of Science.

Article XI—Amendments

This Constitution may be amended or revised at the second annual meeting to be held at Mobile in 1934 by assent of a majority of the delegates present and subject to the approval of the Alabama Academy of Science. All amendments made subsequent to this time must be recommended by a majority vote of the delegates at an annual meeting and accepted by two-thirds of the chapters in good standing within three months from the annual meeting.

NEW YORK COUNTY OFFICE OF RECORDS

77th Street & Central Park West

JUN 6 1939

NEW YORK, N. Y.

THE JOURNAL

of the

ALABAMA ACADEMY
OF SCIENCE

For 1935

VOLUME VI

PROCEEDINGS

of

THE ELEVENTH ANNUAL MEETING

SPRING HILL COLLEGE, 1934

Office of the Editor

BIRMINGHAM-SOUTHERN COLLEGE

Birmingham, Alabama

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Office of the Editor
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Birmingham, Alabama

OFFICERS OF THE ACADEMY 1934 - 1935

President, RUSSELL S. POOR.....
..... Birmingham-Southern College, Birmingham, Ala.

Vice-Presidents :—

T. E. HUNT..... University of Alabama

C. A. BASORE..... Alabama Polytechnic Institute

W. B. JONES..... University of Alabama

F. F. CUNNINGHAM..... State Teachers College, Florence

Secretary, P. H. YANCEY..... Spring Hill College, Mobile, Ala.

Treasurer, A. G. OVERTON.....
..... Alabama By-Products Corp., Tarrant, Ala.

Editor of Journal, ERNEST VICTOR JONES.....
..... Birmingham-Southern College, Birmingham, Ala.

Councilor to A. A. A. S., E. B. CARMICHAEL..... University, Ala.

1933 - 1934

President, J. L. BRAKEFIELD..... Howard College, Birmingham, Ala.

Secretary, W. A. WHITING..... Birmingham-Southern College

Treasurer, A. G. OVERTON..... Tarrant, Ala.

Editor of Journal, ERNEST VICTOR JONES..... Birmingham, Ala.

Councilor to A. A. A. S., E. B. CARMICHAEL..... University, Ala.

Chairmen of Sections, 1933 - 1934

Biology, SEPTIMA SMITH..... University

Chemistry, Physics and Mathematics, ROGER W. ALLEN..... Auburn

Geology, Anthropology, Archeology, R. S. POOR..... Birmingham

Industry and Economics, E. A. HAWK..... Birmingham

Medicine, F. S. DUBOIS..... University

Past Presidents

WRIGHT A. GARDNER (2 terms)..... Auburn..... 1924-1926

STEWART J. LLOYD..... University..... 1926-1927

JOHN R. SAMPEY..... Howard College..... 1927-1928

WALTER C. JONES..... Birmingham..... 1928-1929

FRED ALLISON..... Auburn..... 1929-1930

EMMETT B. CARMICHAEL..... University..... 1930-1931

GEORGE J. FERTIG..... Birmingham..... 1931-1932

J. F. DUGGAR..... Auburn..... 1932-1933

J. L. BRAKEFIELD..... Howard College..... 1933-1934

**GENERAL ANNUAL MEETING PROGRAM, ALABAMA
ACADEMY OF SCIENCE, SPRING HILL
COLLEGE, 1934**

Friday, March 9th

- Registration:* Room I, Thomas Byrne Memorial Library
- 12:30 P.M. Executive Committee Meeting
- 2:00 P.M. *Opening Session:* Dr. J. L. Brakefield presiding, Room 4 of Thomas Byrne Memorial Library
Addresses of Welcome by President J. J. Druhan of Spring Hill College and by Mayor Cecil Bates of Mobile
Response by Dr. R. S. Poor, Vice-President of the Academy
- 2:30 P.M. *First Business Session:* Reports of the officers of the Academy and the appointment of various committees
- 3:00 P.M. *Section Meetings:*
II. Chemistry, Physics and Mathematics, Chemistry Lecture Room, second floor of Yenni Hall
III. Geology, Anthropology and Archeology, Biology Lecture Room, third floor of Yenni Hall
IV. Industry and Economics, Room 3 of Thomas Byrne Memorial Library
V. Medicine, Room 4 of Thomas Byrne Memorial Library
Demonstrations in Physics and Biology laboratories.
- 7:00 P.M. *Annual Banquet* in College Dining Hall
Dr. E. B. Carmichael, Toastmaster
The Presidential Address, "Samuel Wallace Welch," President James L. Brakefield, Howard College, Birmingham, Ala.
- 9:00 P.M. *Annual Reception* in Thomas Byrne Memorial Library

Saturday, March 10th

- 9:00 A.M. *Final Business Session:* Room 4 of Thomas Byrne Memorial Library. General business including the election of officers. Photograph of Academy members following business session.
- 10:00 A.M. *Section Meetings:* I. Biology in Physics Lecture Room, first floor of Yenni Hall. Other sections as previously assigned.
- 2:00 P.M. *Trip to Bellecamp* (Bellingrath Azalea Gardens) for those who signed for it when registering.

JUNIOR ACADEMY

- 8:30 A.M. *Sessions* in Auditorium, Spring Hill High School.
Exhibits in Gymnasium, Spring Hill High School.

MINUTES OF THE EXECUTIVE COMMITTEE OF
THE ALABAMA ACADEMY OF SCIENCE,
MARCH 9, 1934

1. The meeting was called to order by President James L. Brakefield. Time 12:30 P.M.
2. President Brakefield outlined a plan for the election of a president elect.

It was moved by E. B. Carmichael, seconded by R. S. Poor and passed that the idea be put into effect as soon as plans could be formulated.

Dr. Carmichael and Poor were appointed to work out and write an amendment to the constitution embodying the idea.

3. It was moved by R. S. Poor, seconded by E. B. Carmichael that a committee on place of meeting be appointed. The motion also stated that all invitations must be in the hands of the committee at least 30 days before the annual meeting. Motion passed.
4. Mr. A. G. Overton was appointed as a committee of one to investigate the feasibility of incorporating the Alabama Academy of Science. He is to report at the 1935 meeting of the Academy.
5. It was moved, seconded and passed that a committee be appointed by the next president to study available sections for the Academy and to further study the relationship of the present existing sections to other organizations.

Dr. DuBois suggested that Dean Graves of the University of Alabama Medical School be placed on the committee.

6. Dr. Sampey recommended the adoption of the Constitution of the Junior Academy. The executive committee accepted the recommendation and voted to submit it to the Senior Academy for adoption.
7. Dr. Emmett B. Carmichael called attention to the Student Science Clubs of America. The Secretary of the Academy was authorized to bring this matter to the attention of the new president.

(Signed) W. A. WHITING, Secretary.

**MINUTES OF THE ELEVENTH ANNUAL MEETING
OF THE ALABAMA ACADEMY OF SCIENCE
AT SPRING HILL COLLEGE,
MARCH 9 AND 10, 1934**

The meeting was called to order at 2:00 o'clock Friday afternoon, March 9th, in the Thomas Byrne Memorial Library. President James L. Brakefield presided.

The Academy was welcomed to Spring Hill College by the Reverend John J. Druhan, President of Spring Hill College, and to Mobile by Mr. Harry Seale, city attorney. Dr. Russell S. Poor, Vice-President of the Academy, responded to these addresses. Following the welcome addresses, the following business was transacted:

1. Secretary W. A. Whiting read the minutes of the tenth annual meeting. The minutes were approved as read.
2. Secretary W. A. Whiting read the report of the Editor of the Journal. Report approved. Report appended.
3. Mr. A. G. Overton gave the Treasurer's report for 1933-34. It was referred to the Auditing Committee.
4. Dr. Emmett B. Carmichael, Councilor to the A. A. A. S., read his report and it was approved. Report appended.
5. The report of the Committee on Incorporation of the Academy was read. Report was accepted as read. The committee was discharged by President J. L. Brakefield. A new committee was authorized to report next year.
6. Dr. R. S. Poor read a report concerning the Junior Academy of Science as prepared by Dr. Sampey. The report, together with the constitution as drawn up for the Junior Academy and as approved by the Executive Committee, was adopted. Report appended.
7. Father P. H. Yancey, chairman of the local committee, gave a report on arrangements and changes in the program.
8. President James L. Brakefield read the committee appointments as follows:
 - (a) Auditing Committee:
B. F. Clark and Walter B. Jones.
 - (b) Nominating Committee:
P. D. Bales, R. W. Allen, Septima Smith, E. A. Hawk,
K. T. Hart.
 - (c) Resolutions Committee:
R. S. Poor and Thera Mae Towery.
9. Following an informal discussion of several topics, the business session adjourned to convene on Saturday at 9:00 A.M. The various sections of the Academy went into session at 3:00 P.M. Friday for presentation and discussion of papers.

The annual banquet was held at 7:00 P.M. Friday in the College Dining Room. Dr. E. B. Carmichael served as toastmaster. At the end of the banquet, Dr. James L. Brakefield gave the presidential address, "Samuel Wallace Welch". The annual reception, which was held in the Thomas Byrne Library, followed the banquet.

The final business session was called to order at 9:00 A.M. Saturday, March tenth, by President J. L. Brakefield.

Business transacted:

1. Dr. Carmichael, chairman of the committee on place of next convention reported that the invitation of the Florence Teachers College had been approved. The report was accepted. The secretary was instructed to notify the president of Florence Teachers College that the Academy would meet there in 1935.

2. Dr. B. F. Clark reported for the auditing committee. The committee found the transactions to be correct and recommended that all disbursements be made by check. The report was adopted. Report appended.

3. Dr. R. S. Poor read the report of the Resolutions Committee.

4. Professor Paul Bales reported for the Nominating Committee. Report was adopted, and the following officers declared elected for the following year:

President—R. S. Poor

Secretary—P. H. Yancey

Treasurer—A. G. Overton

Editor of Journal—E. V. Jones

Councilor to A. A. A. S.—E. B. Carmichael.

President James L. Brakefield expressed his appreciation for the support given him during the period of his services to the Academy.

5. All committees were honorably discharged. The business session adjourned, and the various sections immediately went into session.

(Signed) W. A. WHITING.

Note: The meeting was well attended and an excellent program of 64 papers was presented. Forty-five members registered and 29 visitors. The chief interests of the members were recorded as follows: Biology 14; Chemistry, Physics and Mathematics 9; Geology, Anthropology and Archeology 9; Industry and Economics 9; Medicine 7. (Editor).

Report of Treasurer for the Year Ending March 8th, 1934
Receipts

Balance on hand, March 9, 1933, Tar-		
rant American Savings Bank.....	\$256.65	
Balance on hand, cash.....	11.00	
	<hr/>	
Total on hand.....	\$267.65	
Membership fees	155.00	
Banquet Fund.....	21.75	
American Association for the Advancement of of Science.....	16.50	
Cash advance by Dr. W. A. Whiting through error	1.00	
	<hr/>	
Total Receipts.....		\$461.90

Disbursements

Postage—		
A. G. Overton.....	\$5.40	
W. A. Whiting.....	5.50	
J. R. Sampey.....	5.00	
E. B. Carmichael.....	8.00	
E. V. Jones (incl. typist).....	7.60	
R. S. Poor.....	4.28	\$ 35.78
	<hr/>	
1 Recording Book (E. B. Carmichael).....		4.00
Journal—Alabama Printing Company (E. V. Jones)		125.75
Stationery—Orville Printing Co.....		22.50
Ledger Sheets—James A. Head, Inc.....		1.10
Programs—The Weatherford Printing Co.....		24.00
1 Photo—Birmingham View Co.....		2.50
Birmingham-Southern College—Posters and Stationery		10.25
Birmingham-Southern College—Banquet and Tea		25.34
Tax on checks (Tarrant American Savings Bank) .....		.32
Remitted Dr. Whiting, Money Advance.....		1.00
	<hr/>	
Total Disbursements.....		\$252.54

Balance on hand, March 8, 1934, Tarrant	
American Savings Bank.....	209.36
	<hr/>
	\$461.90

(Signed) A. G. OVERTON, Treasurer,
Alabama Academy of Science.

Audited and found correct by Auditing Committee: W. B. JONES, B. F. CLARK, Chairman.

Report of the Councilor to the A. A. A. S.

Mr. President, Members of the Alabama Academy of Science and Guests:

The Boston meeting of the A. A. A. S. took place during the last Christmas holidays. The meeting was well attended considering the depth of the snow and the sub-zero weather.

I shall divide my report into two parts for your convenience: (1), The Academy Conference and (2), The Council of the A. A. A. S.

I. Academy Conference of the A. A. A. S. The Academy Conference was held at 12:30 P.M. Wednesday, December 27. The councilors of the academies constitute the membership in the conference. The business session followed a complimentary dinner by the A. A. A. S. The program was to have consisted of two papers but the first speaker was snow bound for almost a day in Ohio and arrived the day after our meeting. The program as arranged is as follows:

1. A Study of the Qualifications of Junior Academy Leaders, by Dr. Joseph Gilman. (Iowa Academy). (This report was requested by the Conference last year.)

2. In computing a Science Teachers Hours of Teaching How Many Hours of Laboratory Teaching Should Be Considered Equivalent to an Hour of Class Recitation, by E. C. L. Miller, (Virginia Academy). The second paper was very interesting and a discussion lasted for forty minutes and was stopped because the members had to attend a Council meeting. The discussion was so long and lively that it was decided to print and circulate the remarks of each representative on the subject. The material is being assembled at present.

Your councilor made a motion that each state academy of science should act as an agent to collect any information concerning their own early natural scientists. The records of contributions and photographs of many obscure scientists should be preserved.

II. The Council Meetings of the A. A. A. S. The meetings were unusually dull and very poorly attended. This was

probably due to numerous causes; snow, temperature, and location of the meeting place.

1. Membership: The A. A. A. S. had a net loss in members from September 30, 1932 to September 30, 1933 of 1,116. Membership 18,549.

About 1,000 members took advantage of the ruling, which allowed individuals with sketches in the fifth Edition of the American Men of Science, to become fellows of the A. A. A. S.

2. Treasurer's Report. A copy is available for inspection.

3. Permanent Secretary's Report. A copy is available for inspection.

4. The new president, Dr. Edward L. Thorndike, is a Professor of Psychology at Columbia University.

(Signed) EMMETT B. CARMICHAEL, Councilor.

Condensed Report of Committee on Organization of a Junior Academy

The initial meeting of the Alabama Junior Academy of Science held at Birmingham-Southern College, Saturday morning, March 11, 1933 was a most enthusiastic one. More than 100 were in attendance at the session, and the eleven papers on the program were of a high order. The scientific exhibits attracted even more attention and favorable comment. Awards were made as follows for the best exhibits: Biological Division: 1st place to Ramsay High, 2nd place to West End High, and 3rd place to Fairfield High. Physical Division: 1st place to Fairfield High, 2nd place to Phillips High, and 3rd place to Woodlawn High. The following officers were elected: President Winthrop R. HUBLEY of Ensley High, Vice-President, Robert E. CHAMBERS of Woodlawn High, and Secretary, Martha BRAY of Ramsay High.

Following the meeting the officers of the Junior Academy and the three members of the Organization Committee residing in Birmingham, namely, Dr. POOR, Dr. XAN, and the chairman drew up a constitution for the Junior Academy with the help of Prof. W. W. DRAKE of the Ensley High and Prof. L. M. HARRISON of Woodlawn High. The newly drafted constitution was approved by the Organization Committee and later ratified by each chapter.

Another activity started shortly after the initial meeting was the drawing up of a list of speakers from the Alabama Academy of Science to help the clubs that were members of the Junior Academy. This list was circulated to the high schools, and there have been many expressions of appreciation for this service from the young people. Those drafted

for this duty includes Dr. R. S. Poor, Dr. B. F. Clark, Dr. W. A. Whiting, Professor W. A. Moore, Dr. John Xan, Dr. J. T. Mackenzie, and the chairman. It is hoped that similar lists may be prepared in other sections as the organization becomes more of a statewide body.

From the printed program you will see that fifteen of the seventeen chapters* are represented at this second annual meeting of the Junior Academy. This was made possible by the generous offer of the Mobile schools to entertain in their homes Friday night, March 9, all out-of-town members of the Junior Academy. Their hospitality is a challenge to other parts of the state.

The Organization Committee recommended:

1. That the constitution of the Junior Academy be approved.**

2. That the committee be dismissed.

3. That the President of the Alabama Academy of Science each year appoint two Councilors to serve with the Junior Academy as specified in the constitution of that body.

4. That more members of the Academy be urged to offer their services to the Junior Academy Councilors as speakers on the club programs of the Junior Academy.

5. That the Alabama Academy of Science encourage members of the Junior Academy to join the parent organization upon graduation from high school by granting to high school seniors, whose chapters are in full and regular standing with the Junior Academy, the special grade of membership to be known as Junior Member. The annual dues for this membership to be one dollar.

R. W. ALLEN,
W. M. JACKSON,
J. P. MONTGOMERY,
R. S. POOR,
P. T. STONE,
JOHN XAN,
P. H. YANCEY,
JOHN R. SAMPEY,
Chairman.

*A list of charter chapters was published in the 1934 Journal, Vol. V, p. 45.

**Through a misunderstanding the constitution was published in the 1934 Journal before its adoption. Editor.

Report of the Editor of the Journal

The editor regrets very much his inability to attend the Mobile meeting.

Volume V of the Journal has been mailed by the Secretary to most of our members who might not be present at this meeting. Those members who have not received their copy should get one at the registration desk.

Unfortunately we were not able to secure abstracts of about one-third of the papers presented at last year's meeting. All groups cooperated splendidly, however, except the industrial and medical groups.

We have added two new features with this year's Journal, namely, indicating the chief field of interest of each member by a letter following the name, and supplying reprints of abstracts at a very attractive rate for those who desired them. We considered a suggestion that we publish the abstracts of this year's papers in this volume of the Journal but gave it up because it was evident we could not secure abstracts for a considerable number of the papers. I wish to express my appreciation for constructive criticisms that have come in with reference to the Journal. Some of these have been acted upon. Others have been referred to the Executive Committee for action.

We have increased somewhat our files of exchanges and are expecting to receive soon the bound volumes of the records of the Alabama Industrial and Scientific Society founded in 1891.

I wish to urge again upon each member who presents a paper and especially upon each of the Vice-Presidents the necessity of furnishing an abstract for each paper presented.

(Signed) ERNEST VICTOR JONES, Editor,
Journal Alabama Academy of Science.

ABSTRACTS OF PAPERS PRESENTED MARCH 9TH AND 10TH, 1934

SAMUEL WALLACE WELCH
(1861 - 1928)

The address of the retiring president of the Academy, J. L. Brakefield, Howard College.

The address was divided into three parts:

1. A resume of the Public Health Administration in Alabama from the time of its organization under the leadership of Dr. Jerome Cochran up to 1917.

2. An outline of the early life, education and medical career of Dr. Welch covering a period of approximately forty-five years.

3. A more detailed discussion of the development of the Public Health System of Alabama during the administration of Dr. Samuel Welch.

Among the manifold developments in the Public Health System of Alabama were mentioned: (1) The organization and development of County Boards of Health. (2) Model law for registration of births and deaths. (3) Inspection of food and dairy products. (4) Water supplies. (5) Child Welfare. (6) Tuberculosis Commission. (7) The organization and development of state laboratories and (8) Appropriations for health work.

Considerable discussion was also given to the results of these many developments and to Alabama's place in Public Health in America.

BIOLOGY

A NEW TYPE OF ASIMINA FROM ALABAMA.

—W. Wolf, O. S. B., St. Bernard College.

A review of a field investigation from 1904 to 1923 in two phases. 1st—The discovery of a particular type of *Asimina* new to Alabama. Flower characters indicating relationship with *A. triloba*; seed characters indicating relationship with *A. parviflora*,—hybrid assumed but thrown in doubt by the complete absence in locality of *A. triloba*. 2nd—Discovery of a unit-assembly of the type in question. Flower and seed characters **constant** and in conformity with the original discovery, —no *A. triloba* found. Facts favor the assumption of distinct species.

MORPHOLOGY OF THE CHROMOSOMES OF DROSOPHILA MELANOGASTER.

—Berwind P. Kaufmann, University of Alabama.

The chromosomes of this fly have been followed through the entire cycle of somatic mitoses, primarily in the neurocytes. The eight chromosomes of the complex are characterized by differences in size and shape, and in positions of primary and secondary constrictions. The proximal constriction in the X-chromosome and that in the short arm of the Y, are concerned with the normal development of the nucleoli. Anaphase chromosomes are longitudinally double, the split following the turns of the chromonemata. Somatic pairing reaches its maximum expression during the late prophase. Then the four chromatids of the tightly appressed homologues open out in two planes giving distinct chiasma-like configurations. Separation of the paired chromosomes is completed in late prophase, so that at metaphase homologous chromosomes are not in contact.

INTERCHANGE BETWEEN X- AND Y-CHROMOSOMES OF DROSOPHILA MELANOGASTER.

—Berwind P. Kaufmann, University of Alabama.

Detached X-chromosomes from \overline{XXY} females of *D. melanogaster* were observed cytologically to be of two types, either V-shaped or J-shaped. Both types apparently occur with equal frequency. The former type is interpreted as a compound consisting of a rod-shaped X and the long arm of the Y-chromosome (the \overline{XY} chromosome). The J-shaped chromosome is regarded as a compound consisting of the X and the short arm of the Y (the \overline{XS} chromosome, a type of compounding previously undescribed). The suggestion is offered that detachment occurs as a result of exchange between X- and Y-chromosomes, involving usually the proximal region of the X and the short arm of the Y.

CERCARIA CATENARIA N. SP., A CYSTOCERCIOUS CER-
CARIA FROM FLORIDA, AND ITS DEVELOPMENT INTO
PROTEROMETRA CATENARIA N. SP.*

—Septima Smith, University of Alabama.

A new species of cystocercous cercaria has been found rather wide-spread in northern and central Florida in *Goniobasis catenaria* Say in three river drainage systems, namely, the Apalachicola, the St. Johns and the Suwannee, and also in southeastern Alabama in *Goniobasis doolyensis* Lea in one drainage system, namely, that of the Choctawhatchee. To this the name *Cercaria catenaria* n. sp. is given. The adult of this form is found in both naturally- and experimentally-infected fish of the family Centrarchidae and belongs to the genus *Proterometra* Horsfall of the trematode family Azygiidae Odhner. The adult thus becomes *Proterometra catenaria* n. sp.

Cercaria catenaria possesses, as its most striking characteristics, a length of 9 to 16 mm., which, at the maximum, is over twice as long as any of this group previously described, and a peculiar, eel-like, sinuous, undulating motion. The slow, deliberate bending back and forth upon the bottom of the aquarium is accentuated by the elongate, neck-like, rounded anterior trunk portion which is usually extended one-half the tail length beyond the anterior end of the distome. This region is capable of great contractility when the cercaria swims. Like the macrostoma group, it possesses spinose papillae which, however, are limited to the posterior half of the tail trunk. The paddles are sharply pointed. The coloration is pale yellow. Emergence occurs during the day, usually in the afternoon. The distome is precociously mature containing both motile, functioning spermatozoa and a few ova. It develops in redia in the mantle cavity of the snail.

Proterometra catenaria shows little development in the definitive host save increase in reproductive activity. Over four hundred ova have been counted in naturally-infected fish, which develop into miracidia within the host. The distome averages about 2.4 mm. in length by 1.4 mm. in width. The ventral and oral suckers are almost spherical, the former averaging 0.26 and the latter 0.64 mm. The most striking morphological difference from the macrostoma distome is this size-ratio of the ventral to the oral sucker which is about 1 to 2.50, that of macrostoma being about 1 to 1.9. It resembles macrostoma in the location and character of most of the other organs.

Three other cystocercous cercariae were found closely associated with *C. catenaria*. One, both as to tail and distome, is definitely of the macrostoma group; the distome of the second resembles this new species, and that of the third resembles *C. stephanocauda* Faust, but in both of these latter cases the tail is conspicuously different from either. The value of tail structure in specific differentiation is becoming increasingly significant in the cystocercous group. These other forms are being taken under consideration as to their taxonomic position.

CHROMOSOME-RING FORMATION IN DROSOPHILA MELANO-
GASTER.*

—Berwind P. Kaufmann, University of Alabama.

The experiment was conducted to test Belling's hypothesis that chromosome rings such as are found in *Oenothera*, are to be explained as resulting from exchange of ends between non-homologous chromosomes. A cytological study was made of spermatogenesis in flies carrying a reciprocal translocation involving the second and the third chromosomes. Late pro-phases and metaphases of the first meiotic division reveal the ring-shaped complex composed of the second and third chromosomes.

*This research was aided by a grant from the National Research Council.



Fig. I



Fig. II

- FIG. 1. *Cercaria catenaria* n. sp. from *Goniobasis catenaria* Say, Silver Springs, Florida. Note location of distome which always lies deep within the anterior end of tail structure. Photomicrograph of living material.
- FIG. 2. *Proterometra catenaria* n. sp. recovered from *Apomotis cyanellus* (Rafinesque) forty-six days after feeding. Note numerous ova in various developmental stages, mass of spermia in cirrus, and small size of acetabulum in comparison with oral sucker. Photomicrograph of living material.

ALABAMA COLEOPTERA.

—H. P. Loding, Mobile, Alabama.

Before the twentieth century Alabama was, you may say, virgin territory for the student of technical entomology and still remains so except for the orders of Coleoptera and Lepidoptera, the latter order has received some attention through Mr. W. C. Dukes and Dr. T. S. Van Aller.

During the early years of 1900 I renewed an old hobby and started investigating the beetle fauna of Mobile County, and a few years later my friend Van Aller joined me in collecting, with the result that today Alabama ranks among the best explored States in the Union.

Definite annotated records of approximately three thousand species have been gained in the State at large, two thousand and five hundred have been recorded from Mobile County.

We have recently published (Bulletin of the Brooklyn Entomological Society, Vol. XXVIII, No. 4, pp. 139-151) a list of five hundred species, which were not known to occur in any of the Gulf Coast States: Alabama, Mississippi, Georgia or Florida.

Five genera and 78 species have been described from Alabama as new to science and many more in the collection of the Alabama Museum of Natural History remain to be described, when additional specimens can be found, or when needed revision of many groups can be undertaken with ample material at hand.

We receive many requests for the loan of such material, and it is needless to say that these are always granted to responsible taxonomists.

Exhibit and lantern slides of Alabama Coleoptera.

LIFE-CYCLE STUDIES AND DISTRIBUTION OF CYSTOCERCUS CERCARIAE.

—Septima Smith, University of Alabama.

From sixty-eight localities in seven States approximately one hundred thousand fresh-water snails have been collected by the author during the past eighteen months in connection with this study. The States concerned are Alabama, Georgia, Florida, Texas, Wisconsin, Illinois and Missouri. The snails are mainly members of the genus *Goniobasis*, of which fifteen species in twenty-one localities, including every State except Missouri, were found infected with cystocercous cercariae. Only one species other than a *Goniobasis* was found to harbor these cercariae, namely, *Pleurocera acuta* in Wisconsin. Other genera collected were two other members of the family Pleuroceridae, namely, *Pleurocera* and *Anculosa*, as well as *Campelema*, *Viviparus*, *Ampullaria*, *Planorbis*, *Physa* and *Lymnea*.

The definitive hosts of these cercariae are sunfish, members of the family Centrarchidae, which are widely distributed in the Central States. They, as well as the intermediate hosts, are peculiarly North American forms. Although conditions suitable for both the molluscan and vertebrate hosts may abound in many places, the factors which determine the presence of these cercariae appear to be the temperature and turbidity of the water.

CYSTOCERCUS CERCARIAE.

—Septima Smith, University of Alabama.

Demonstrations of living specimens, photomicrographs of both cercariae and their adult distomes, and specimens of intermediate and definitive hosts.

THE WORK OF THE FIELD LABORATORY AT SPRING HILL.*

—L. L. English, Alabama Agricultural Experiment Station.

*No abstract furnished for this paper.

PREREDUCTION DURING OOGENESIS IN DROSOPHILA MELANOGASTER.*

—Berwind P. Kaufmann, University of Alabama.

It has often been assumed that in a given tetrad, disjunction may occur at either the first or second maturation division (prereduction or postreduction). When crossing over occurs between two of the four chromatids at any one level, separation must be different on the two sides of the exchange. It is obviously difficult, therefore, to study disjunction of entire chromosomes, but a given region, such as the spindle fiber attachment region, can be studied. For this purpose a translocation involving the second and third chromosomes was chosen. The breaks are near the spindle fiber region so that the effect of crossing over is eliminated. Several hundred eggs were sectioned and many good first anaphase figures were obtained. In no case was the configuration to be interpreted as supporting postreduction. It is concluded therefore, that the spindle attachment regions separate reductionally at the first maturation division.

SOME FACTORS INFLUENCING SEX RATIOS IN THE HUMAN RACE.

—Roland M. Harper, Geological Survey of Alabama.

In the whole world the number of men and women seems to be approximately equal. There are a few more boys than girls born, but a higher mortality among males soon tends to equalize matters. The proportion of the sexes varies greatly in different places, however, and at different times in the same place.

Among the more obvious factors influencing the sex ratio locally or temporarily are migrations of men to newly settled regions, economic conditions (such as mining and heavy industries), and wars. In this country at present (though not always and everywhere) the proportion of women is generally larger in cities than in rural districts.

These factors, together with a differential death rate, involve the population at different ages unequally, making several ups and downs in the curves for sex and age combined.

The sex ratio at birth is not uniform, the proportion of boys being always higher for whites than for Negroes, and apparently higher immediately after wars than at other times, and on farms than in cities. It may also be affected by diet, and some other factors not yet fully understood. The ratio fluctuates within rather narrow limits, though, being seldom less than 1 or more than 1.1, for any considerable population.

Paper illustrated by thirty graphs.

A CASE OF AMYLOID DEGENERATION AND POLYCYSTIC KIDNEY IN THE WILD RAT.

—P. H. Yancey, Spring Hill College.

Demonstration. A gross specimen and a microscopic section (10 per cent formalin fixation stained with Delafield's haematoxylin and cosin) of the kidney of a wild rat showing evidences of the conditions described in the human being as amyloid degeneration and polycystic kidney.

PAPERS READ BY TITLE

1. The Effect of Injections of Purified Corpus Luteum Hormone on the Course of Pregnancy in the Rat.—J. K. Lamar and Nelwyn Huff, Birmingham-Southern College.
2. Investigations of a Possible Variation in the Functional Activity of the Anterior Hypophysis of the Sow During Pregnancy.—J. K. Lamar and Floy Martin, Birmingham-Southern College.
3. The Effects of Injections of Theelin on the Course of Pregnancy in the Rat.—J. K. Lamar and Floy Martin, Birmingham-Southern College.

*This research was aided by a grant from the National Research Council.

CHEMISTRY

SPECIAL ECONOMIC AND TECHNICAL CHARACTERISTICS OF THE CHEMICAL ENGINEERING INDUSTRIES.

—C. A. Basore, Auburn Polytechnic Institute.

The chemical engineering industries are unique in many of their technical and economic characteristics. The technical factors mentioned include a discussion of the importance of scientific control, mass production, research, including the development of processes and products, by-product recovery, and the purification and utilization of wastes, catalytic action, energy utilization, and depreciation.

Economic factors mentioned include a discussion of the special principles of management applicable to the chemical engineering industries, the relatively high financial risks, joint and by-product accounting and the significance of the relatively high capital and raw materials ratios. The mutual dependence of one industry on another, i. e., the finished product from one industry serving as the raw material for another industry, is also discussed.

MODERN APPLICATION AND FUTURE POSSIBILITIES IN THE CHEMISTRY OF FURFURAL.

—B. F. Clark, Birmingham-Southern College.

The results of several researches on furfural at this college were presented with an outline of plans for further work to be begun in this field. A few applications were mentioned in the field of solvents, antiseptics, perfume synthetics, and dyes with a view toward coordination of the results so far obtained.

RECENT DEVELOPMENTS IN THE CHEMISTRY OF FURFURYL ALCOHOL.

—Hewell Samuel and B. F. Clark, Birmingham-Southern College.

It has been found that a considerable difference exists between the solubilities of freshly distilled furfuryl alcohol and that which has been allowed to stand for a considerable period of time. By virtue of color reactions observed with ferric chloride it was proposed that two tautomeric forms of this compound exist, one as ordinarily represented and the other, a hydroxy furan derivative capable of giving characteristic color tests similar to those of other hydroxy furan derivatives.

A PRELIMINARY REPORT ON THE DETERMINATION OF IODINE IN ALABAMA FOODS.

—B. F. Clark, Birmingham-Southern College.

An outline of a proposed systematic survey of the iodine of certain representative foods grown in Alabama was presented, with the analytical results from some two dozen samples already completed. A brief description of the apparatus and methods involved in the determination was given. Iodine is determined by ashing the sample, recovering the iodine from the evolved gases and the ash and estimating colorimetrically with the microcolorimeter in terms of parts per billion of the material analyzed.

THE ANALYSIS OF MIXTURES OF MERCAPTANS, SULFIDES AND DISULFIDES.*

—John R. Sampey, Howard College.

*No abstract furnished for this paper.

THE ATHENS METEORITE.

—L. D. Hampton, Auburn Polytechnic Institute.

The Athens Meteorite fell at about 9:30 in the morning of July 11, 1933, on the farm of W. R. Hardiman about six miles from Athens, Alabama. The meteor was heard in its flight through the atmosphere but was not seen, probably due to cloudy weather which existed at the time. The usual detonations were heard to the northeast of Athens. The meteorite was small, weighing only nine ounces. It is now in the collection of Mr. Stuart Perry of Adrian, Michigan.

THE EFFECT OF CERTAIN FOODS ON THE pH OF THE URINE.

—John Xan, Howard College.

The results obtained in determining the alkalinizing effect of certain foods, particularly string beans, grapes and English peas by two methods are compared. The first method is that of analysis of the ash of a food for excess alkali, while the second method depends on the feeding of a basal diet to a series of individuals and then studying the effect of the addition of some specific food to the basal diet by means of a systematic urine analysis.

Data for first method were taken from "Food Products", by H. C. Sherman in Appendix E. Column "100 c" indicates the excess of base-forming elements contained in 100 calorie portions. The columns headed "100 g" indicate the excess of base-forming elements contained in 100 gram portions expressed in grams.

FOOD	100 c	100 g IGNITION METHOD	100 g FEEDING METHOD
String beans, canned	13	2.6	2.6
String beans, fresh	13	5.4	5.3
Grapes	2.8	2	5.7
Peas, English, canned	1.5	8	2.8

Because of the different values obtained by the two methods, further investigation is recommended by the author.

THE IMPORTANCE OF pH CONTROL IN FLOTATION CIRCUITS.

—G. Dale Coe, University of Alabama.

Data was presented from an investigation of the amenability to flotation of graphite ore, showing the economic importance of accurately controlling the pH of graphite flotation circuits.

GEOLOGY, ANTHROPOLOGY AND ARCHEOLOGY

BARITE DEPOSITS OF THE SINKS DISTRICT, BIBB COUNTY, ALABAMA.

—Walter B. Jones, State Geologist, University of Alabama.

This group of seven known deposits occupying a narrow belt some ten miles long, is located near Sixmile, Ala., in the vicinity of a large number of limesinks, which provide a suitable name for the district. The actual occurrence is in Ordovician limestones, at or near fault planes in sharply folded Paleozoic formations. The Fancher deposit actually occurs along the marginal fault, although it is not known just how far underground the faulted zone is mineralized.

The barite ranges from white to light gray in color, and occurs as veins and in cavities in the limestone. Associated with the barite are such minerals as calcite, fluorite, chlorite, limonite, and in a few instances, beautiful needle crystals of sulphur. Regardless of original color, all samples burn white.

The origin of the barite and associated minerals is regarded as probably hydrothermal, with actual replacement of the limestone an important factor. Due to the intimate association of fluorite and barite, they are regarded as having formed at the same time. The limonite appears secondary, while the sulphur crystals evidently were formed last, from an excess of that element within the mineralized zone.

A REVIEW OF RECENT INFORMATION CONCERNING BATHOLITHS.

—T. G. Andrews, University of Alabama.

The problems that arise in the study of batholiths are outlined, and such information as has been obtained on the subject is summarized. The material embodied in the summary was secured from the report of the Committee on Batholiths of the National Research Council. Recent investigations carried on by Drs. F. F. Grout and Robert Balk are discussed, with comments on the methods used.

CERTAIN OBSERVATIONS FROM A FLOAT AND SINK STUDY OF THE TAILINGS FROM A BROWN ORE WASHER.

—James R. Cudworth, University of Alabama.

This paper describes a part of a more extensive investigation of the tailings material rejected from a washing plant for brown iron ore. In it will be discussed briefly the geological occurrence, mineralogical character and method of treatment of the brown iron ore from the Woodstock, Alabama, district.

The products obtained from the washer are washed iron ore containing iron, manganese, and silica as the principal constituents and a tailings product equivalent to a low grade iron ore which is allowed to accumulate in large quantities in the settling pond. This paper gives the method of analyzing such a product by float and sink tests to determine the possibility of retreating by gravity concentration to recover some of the valuable constituents.

The apparatus used in testing is described and the various heavy solutions necessary are given. A brief summary of the possible use of the float and sink method of analysis for other purposes is included.

GEOLOGICAL FACTORS AND THEIR RELATIONSHIP TO COAL MINING OPERATION.

—L. I. Cothern, University of Alabama.

The paper emphasized the importance of geologic structures such as faulting and folding in relation to coal recovery. It was pointed out that the type of mining of any given coal should be governed first of all by the type of geologic structure and its complexity.

MIDDLE OLIGOCENE CORAL REEFS IN THE GULF COASTAL PLAIN.

—Winnie McGlamery, State Geological Survey, University of Alabama.

Conditions favorable for coral reef development prevailed in the Gulf Coastal Plain and West Indian region during Middle Oligocene time. Coral reefs of this age are recognized in the Salt Mountain Limestone at the Central Salt Works in Clarke County, Alabama, and near Bainbridge, Georgia, along the Flint River. These reefs have been correlated with the coral reefs of the Antigua formation of Antigua and with reefs in Cuba, Porto Rico, Panama, Eastern Mexico and Santo Domingo. The earliest work on the Salt Mountain Limestone was done by the late Dr. Eugene A. Smith. A study of the fauna and later correlations was done by Drs. T. Wayland Vaughan, C. Wythe Cooke and others.

The cherty limestone containing the coral reefs at Bainbridge, Georgia, has been placed in the Glendon formation on the basis of the corals and associated faunas, and the Salt Mountain Limestone correlated with it on account of the species of corals present.

The limestone at Salt Mountain, Alabama, is within the region of the Jackson fault and is out of normal position with relation to formations to the east of it. It is apparently the only exposure of this phase of the limestone in the State.

On a recent visit to this locality, we collected near the top of the "Mountain" large masses of the reef coral *Stylophora ponderosa* Vaughan, other corals as yet unidentified, echinoid spines and fragments, an abundance of bryozoan fragments, two species of very small brachiopods not well preserved, ostracods, and a few poorly preserved Foraminifera. Nearer the base of the "Mountain" the limestone contains an abundance of echinoid spines and fragments and masses of bryozoan remains.

We plan to continue a study of the fauna of this limestone in combination with a study of the structure of the region.

SOME MINERALOGICAL DATA ON THE DUST STORM AT BIRMINGHAM, ALABAMA, NOVEMBER 13, 1933.

—Russell S. Poor, Birmingham-Southern College.

An unprecedented dust storm entered Alabama from the northwest and reached Birmingham at 10:20 a. m. on November 13, 1933. It continued until 3:30 p. m. During much of this time the flying ceiling was very low and the visibility very poor.

The dust was studied by means of a petrographic microscope. About 500 identifications were made. Very few minerals could be definitely assigned to any certain States. Stilbite, tourmaline, biotite, topaz, and volcanic glass suggest that the dust may have been gathered in one or more of the following States: South Dakota, Nebraska, Colorado, Missouri, Kansas, Arkansas. The available meteorological data does not contradict this conclusion.

THE FOSSILS OF GIANT REPTILES FROM THE CRETACEOUS OF ALABAMA.

—J. J. Renger, University of Alabama.

This paper describes the recently unearthed fossils of a giant sea turtle of the family *Protostegidae*, and of the fossils of a sea lizard of the *Mosasauroae* family.

The relation of these contemporary animals is described, and particularly their mode of existence, their source of food, and their structure which aided or hindered in their struggle to survive, as deduced from their anatomical conformations.

A comparison is made with the previously described specimens, and the variations pointed out. The singular anatomical feature of the hinged lower jaw of the *Mosasaurus* and its unique mode of deglutition is described.

ABORIGINAL HISTORY OF THE MOBILE, ALABAMA, DISTRICT.

—Walter B. Jones, University of Alabama.

Moundbuilders. From the somewhat meager evidence now available, it appears that the civilization, which we call the "Bottle Creek" culture, was among the first developed in Alabama. Most of the rest of the mounds are of the sand and shell types, and may not represent any great antiquity.

Prehistoric Indians. We now have records of about one hundred aboriginal sites in the district, and most of them belong in this class. They are predominately shell sites, with no apparent historic connections. Pottery was fairly crude, with some development of effigy types.

Historic Indians. From the records of Colonial times, the region was abundantly settled by Indian tribes. Some of the tribes were friendly, while the massacre at Fort Mims is a horrible example of the unfriendly element. The exact location of historic villages is difficult to determine.

Canal Systems. The rather intricate system of canals at the Bottle Creek Mound group is a splendid example of the commerce of that civilization. Some parts of the system are still in good shape. The great canal connecting Oyster Bay and Little Lagoon is an outstanding feat of aboriginal construction. That canal is nearly a mile long, and afforded ready passage from the Gulf to the Mobile Delta, without the necessity of encountering the rough waters and bars of Mobile Bay.

APPLICATION OF OPTICAL METHODS TO THE IDENTIFICATION OF MINERALS FOUND IN IGNEOUS ROCKS.

—C. A. Basore, Auburn Polytechnic Institute.

Methods for the determination of the index of refraction, color and pleochroism, double refraction, vibration direction, and the distinction between uniaxial and biaxial figures are discussed. These methods are then applied to the identification of the more representative minerals found in igneous rocks.

A STUDY OF THE POTTSVILLE SANDSTONE NEAR BIRMINGHAM, ALABAMA.

—Dean Wellman, Birmingham-Southern College.

The Pottsville formation outcropping on Shades Mountain near Birmingham, Alabama, is a hard resistant sandstone, offering a difficult problem in its disaggregation. Several methods of disaggregation are briefly discussed. In many cases it cannot be broken without injury to the grains, but when the sandstone is at all friable, hammering the specimen between two pieces of rubber is very effective and results in minimum fracturing of the particles. The petrology of the sandstone is discussed, particularly

in view of the results of the mechanical analyses of the sands. The shape and mineral content of the aggregates are briefly described; a more detailed report on this phase of the analysis is to be given later. Recognizing the incompleteness of the data obtained, it seems to indicate: (1) That the source of the sediment was a nearby land mass; (2) that the sediment was deposited by stream and shore currents, and (3) that the sediments are not reworked deposits, but derived from a crystalline land mass.

SOME ASPECTS OF SEDIMENTARY PETROGRAPHY.

—T. N. McVay, University of Alabama.

Mineral grains from igneous and metamorphic source rocks but occurring in sediments were shown and described. The technique of identification was described and the significance of the minerals as source rock indicators was explained.

SEISMOGRAPHS, OLD AND NEW.

—A. J. Westland, Spring Hill College.

All seismographs are essentially pendulums and fall generally into two types, the horizontal and vertical according as they are to record the vertical or horizontal components of the earth's movement. A complete seismograph should, theoretically at least, be capable of recording the three component rotations. These, however, being confined to a very small area near the epicenter seem to be negligible.

All the newer types of seismographs have artificial damping, wherein an effort is made to keep the rate of damping proportional to the velocity. The damping devices according to the various kinds of seismographs are air, liquid, magnetic. The necessary magnification is obtained (a) by the extension of the boom in a single or multiple lever system as in the Milne and Wiechert; (b) by an optical lever as in the Bosch Photographic; (c) by electromagnetic and radio-frequency-oscillation coupling between the pendulum and the recorder.

Registration, naturally, is either mechanical or photographic, this latter being either purely optical or galvanometric. As for the timing methods, they may depend on the uniformity of rate of rotation of the recording drum; the minute and hour marks from an accurate clock made by lifting the pen or interrupting the current in optical registration, or finally upon the automatic recording of radio time-signals.

The variation in form of suspension, method of amplification, damping, and registration exemplified (by slides) in the Milne, Wiechert, Omori, Milne-Shaw, Galitzin, Galitzin-Wilip, Wood-Anderson, Ewing-Gray-Milne, Bosch and Wenner.

THE TENNESSEE VALLEY OF ALABAMA AND ITS PEOPLE.

—Roland M. Harper, Geological Survey of Alabama.

The Tennessee Valley in Alabama is mainly that portion of the state north of the plateau region (Sand Mountain), an area of about 4,000 square miles. The soils, largely derived from limestone, are comparatively level and about the average in fertility. Limestone, iron ore, and asphalt rock are mined, mostly in the western portion. The region has large springs and important water power. Agriculture is the leading industry and about half the area is under cultivation.

In 1860 slaves constituted over half the population in the most fertile counties. With the growth of manufacturing industries the proportion of Negroes has decreased to less than 25 per cent in 1930. The population has increased pretty steadily from almost none in 1800 to over 60 per square mile in 1930, when not quite half the whites were over 21. The ratio of

divorces to marriages has fallen off sharply since 1926, partly on account of changes in the marriage laws of Tennessee about that time.

There is much local diversity in the Valley, correlated with different geological conditions. Economic changes connected with the growth of manufacturing have brought about still other differences, only remotely related to soil or topography. For example, Huntsville, an old settlement of considerable culture, is surrounded by manufacturing suburbs with a very different type of population, but all with the same geological conditions.

The paper was illustrated by a generalized soil map of the whole area, three statistical graphs, and two tables.

GEOLOGICAL PROBLEMS OF THE PROPOSED TRANS-FLORIDA CANAL.

—S. J. Lloyd, University of Alabama.

There is only one serious geological problem involved in the project, the nature of the Ocala limestone. Its extreme porosity makes difficult the retention of water in the canal when the latter is above the natural ground level, and also tends to the drainage into the canal of adjacent water when below, causing diversion of the flow of springs, etc. (Silver Springs, Blue Springs.) The unsatisfactory nature of the rock has also necessitated an elaborate and expensive design for the two locks and dams within its area.

INLAND WATER TRANSPORTATION IN ALABAMA.

—John H. Goff, Auburn Polytechnic Institute.

Contrary to popular belief, transportation on Alabama rivers has not become wholly unimportant in the commerce of the State. Particularly is this true of the Tombigbee, Warrior, and Black Warrior Rivers, where traffic has gained in importance until the present-day movement exceeds many times, in both tonnage and value, the commerce of old steamboat days. The following figures from the Annual Reports of the Chief of Engineers, U. S. Army, represent the importance of the increase:

VESSEL TRAFFIC

YEAR	TONS	VALUE
1894	3,400	not given
1904	20,552	not given
1914	361,812	\$ 4,696,622
1924	928,501	15,356,150
1929	1,686,200	43,178,058
1932	836,908	27,289,616

The Tombigbee-Warrior Rivers System has been completely canalized by Army engineers so that an all-year navigable depth of eight feet prevails for a distance of 425 miles from Mobile to the industrial and mining regions around Birmingham. Modern towboats and barges handle the cargoes. Eighteen terminals exist with facilities for handling ores, logs, steel products, gasoline, sugar, cotton, etc. The chief commodities shipped down river are: Cotton, tobacco, steel, coke, lumber, limestone; important up river goods are: Refined sugar, rubber, gasoline, ores, coffee, bagging and fertilizer materials.

INDUSTRY AND ECONOMICS

MINIMUM TEMPERATURES IN REFERENCE TO CITRUS CULTURE IN SOUTHERN ALABAMA.

—Frank T. Cole, Mobile, Alabama.

The satsuma-orange growing section in southern Alabama is subject to severe fluctuations of winter temperatures. Minimum temperatures of 68 degrees F., and maximum of 21 F., have been recorded at Mobile, with an extreme low of 1 below zero in February, 1899. The critical temperature for satsuma trees is 20 F., and temperatures of 20 degrees or lower have occurred 56 times in 27 winters since 1871, and in six winters, 2 damaging freezes occurred.

Commercial growing of satsumas in Alabama began early in the present century, and the first shipments of fruit began about 1914. Due to favorable weather conditions the industry expanded rapidly, but received a severe set-back in 1924, when a cold wave killed many trees. There was a total of 15 hours of 20 degrees, or lower, in two nights. Since 1924 there have been several other freezes, that reduced the crop and damaged the trees, and an average of two crops out of seven have been lost from cold.

Until after 1924, no attempts were made to heat the orchards. Open flame oil heaters, California style, were used first. These proved ineffective, because damaging temperatures along the Gulf Coast are accompanied, usually, by high winds. A coke heater has been developed which gave results during the freeze of February 8-9, 1933, and a crop was made only where it was used.

It has been difficult to persuade the satsuma growers to heat their orchards, but without a regular crop the industry is doomed. Oranges from other sections fill the satsuma markets during off years, and it has become increasingly difficult to market this excellent fruit.

A CYCLIC PROCESS FOR THE PRODUCTION OF AMMONIUM PHOSPHATE.

—A. M. Kennedy and Stewart J. Lloyd, University of Alabama.

Hitherto, in making phosphate products from phosphate rock, either sulfuric acid alone, or silicic acid plus heat has been necessary, the heat being furnished either by electrical energy or fuel. The process described uses carbonic acid to fix the calcium of the phosphate rock, and depends essentially upon the smooth and easy conversion by heat of ammonium sulfate to ammonium bisulfate at a low temperature. United States Patent No. 1816051 covers the process.

THE CHEMISTRY OF PULP AND PAPER MAKING, PARTICULARLY OF THE SULPHATE PROCESS.

—A. W. Pesch, Mobile, Alabama.

Paper is made by filtering a water suspension of suitably prepared cellulosic fibers. Some kind of paper can be made from any kind of vegetable material containing cellulose, but cellulose is essential.

Modern paper making received a great impetus in the invention of the Fourdrinier machine about 1800. But the development of the groundwood, soda, sulphite and sulphate processes (about 1850-1885) paved the way for the present development of the industry by providing adequate amounts of suitable paper making material.

The manufacture of chemical pulp from wood is possible on account of the relative inertness of cellulose and the structure and arrangement of the cellulose fibers with respect to the "encrustments".

Both "softwoods" and "hardwoods" are used, but the former to a much larger extent (except for soda pulp), because of the longer and stronger fibers. Wood is and almost certainly will remain the most important source of paper.

Sodium hydroxide and sodium sulphide are the essential ingredients of the cooking liquor in the sulphate process. The cost of the chemicals used in cooking sulphate pulp makes efficient chemical recovery essential and is responsible for the rather extensive recovery equipment used in the process. Sodium sulphate used for replenishing chemical losses accounts for the name of the process. This sulphate is reduced to sulphide before introduction into the cooking liquor. The strength of sulphate pulp and the ability to utilize a wide variety of woods are the chief features of the process.

Before conversion into paper, pulp must be mechanically "refined" and variously treated depending upon the properties required in a specific grade of paper.

SOUTHERN KRAFT CORPORATION REFORESTATION ACTIVITIES.

—R. A. Bingham, Mobile, Alabama.

The Southern Kraft Corporation, a manufacturer of Kraft Paper from Southern pines, has, within recent years, acquired over one million acres of cut over and depleted timber land located in five Southern States.

The purchase of these lands was for a dual purpose, namely, to insure a future supply of pulp wood for its plants, which required an investment of millions of dollars; secondly, for the purpose of demonstrating to the public and more especially to the countless number of smaller land owners the real benefits to be derived from their woodlands when properly managed.

Our plan is to follow the same course which, if left alone, nature would take. Nature starts off an acre of cut-over pine land with 800 to 1,000 pine seedlings. Left alone, nature would not mature more than ten or twenty of these seedlings, and that in a long lifetime. However, some twelve to eighteen years after nature starts those seedlings there is on that acre around one hundred trees that are suitable for pulp wood. That is harvest time for that acre. The paper company practices the leaving of three or four seed trees per acre, and advocates the reserving for piling and saw-milling such timber as has a greater value for those uses than for pulp wood.

The company maintains a fire-control system on the major part of its forests. This system consists of fire lane along section lines and public roads, lookout towers, telephone lines and improved roads, with forest rangers or riders who are on the lookout for fires and trespassers.

Our Southern States making up the yellow pine belt can surely be made to supply, perpetually, the Nation's needs in so far as naval stores, pulp wood and lumber are concerned.

MODERN MANUFACTURE OF SULPHATE PULP AND KRAFT PAPER.*

—G. W. E. Nicholson, Mobile, Alabama.

*No abstract was furnished for this paper.

MATHEMATICS AND PHYSICS

THE CAYLEY-KLEIN REPRESENTATION OF NON-EUCLIDEAN GEOMETRY.

—Henry Gerhardt, Spring Hill College.

Lagguere's formulae enable us to express any angle in an Euclidean plane as a cross ratio.

The absolute figure of reference in an Euclidean plane is the two imaginary circular points—a degenerate conic.

In the Euclidean space, on the plane at infinity a different condition is encountered, as the absolute figure of reference is the imaginary circle—a non-degenerate conic.

By defining the intervals between two points and two lines as a certain function of the cross ratio, in reference to an absolute conic, we will arrive at a general system of geometries, including as special cases the so-called parabolic (Euclidean), hyperbolic (Lobatchevsky-Bolyai), and elliptic (Rieman).

This paper attempted to demonstrate that the so-called curvature of the non-Euclidean plane is but a metrical constant, contained in the different varieties of measurement, thus enabling the avoidance of such a misleading conception as the non-Euclidean plane would not, in reality, be as "plane" as the Euclidean.

As the absolute conic can be real or imaginary, degenerate and non-degenerate, we have at our disposal a variety of logically consistent systems, the formerly mentioned three embracing all possible of application in our physical world.

ON A SECOND ORDER CORRECTION FOR THE FINITE RESOLVING POWER OF AN EXPERIMENTAL MEASUREMENT.

—W. N. Arnquist, Auburn Polytechnic Institute.

Due to the fact that all intensity measurements are made with a finite resolving power, the curve obtained experimentally is not, in general, proportional to the true function. If the resolving power is known and constant, the relationship can be expressed as a differential equation which can be evaluated in terms of the higher derivatives of the experimental curve. The first correction is of the second order involving the second derivative. For an illustration showing the application of the correction, an empirical equation is assumed, the function that would be measured with a particular resolving power is calculated and the correction applied.

THE DYNAMICS OF GRANULAR MEDIA.

—Ralph D. Doner, Auburn Polytechnic Institute.

This paper deals with media having the following characteristics: Composed of solid particles somewhat irregular in size and shape; internal friction or shear (s), defined as the force necessary to shear unit surface under unit normal pressure; no cohesive force; dry; and independent of moderate temperature changes.

First, the law of compression is derived and found to be

$$(V_p - V_\alpha) / (V_0 - V_\alpha) = e^{-kP}$$

where V_p is the volume corresponding to the pressure P .

Next, the cross-pressure P_c is found in terms of s and P . It develops that P_c is proportional to P , and the ratio P_c/P is a function of s . This relation is exhibited graphically.

Finally a medium is assumed to have an initial compaction P_0 , and its

reaction to a plunger is investigated. It is found that as the plunger sinks into the medium the disturbed region extends below in the form of a pyramid whose angle of divergence θ is a function of s , and whose depth is a function of θ , P_0 , and the load w on the plunger. Also the depth of sinking in of the plunger is a function of θ , P_0 , and w .

Reference is made to such applications as the strength of walls for storing grains, lime, gravel, and the like. Similarities and differences between this class of media and soils are pointed out.

A FAMOUS THEOREM IN MECHANICS.

—J. H. Meyer, Mobile, Alabama.

An ex-professor of mathematics presented an historical paper on the Theorem of Pappus and Guldinus which he entitled, "A Famous Theorem in Mechanics".

MEDICINE

WHAT WE KNOW ABOUT CANCER.*

—William R. Meeker, M.D., Mobile, Alabama.

DISCUSSION OF CANCER CONTROL, MOTION PICTURE.*

—I. M. Gravlee, M.D., Mobile, Alabama.

SOME PRACTICAL CONSIDERATIONS OF DENTAL MYOLOGY.

—George J. Sullivan, D.D.S., Mobile, Alabama.

Myology is of vast importance to dentistry, and I will attempt to explain some of the fundamental relationship between the loss of teeth and the result of this loss on the muscles of the face.

It is a very interesting subject, since all of us are interested in our facial appearance. Muscles beneath the skin of the face will either give us a good appearance or bad, according to the tone of the muscle.

Numerous patients ask questions about restoring their normal appearances, but after an explanation about the facial muscles, they begin to see the light. In practically every extraction of a tooth, some facial muscle is affected in some manner, although it might be of small importance.

In my paper, I have covered only the fundamentals, and the most important muscles of the face, giving examples and pointing out why certain muscles atrophy on extraction of certain teeth, and also I explained the muscular action of the tongue cooperating with the teeth in pronunciation.

THE DIFFERENTIATION IN CHORIO-ALLANTOIC GRAFTS OF ISOLATED ECTODERM-MESODERM AND ENTODERM-MESODERM OF EARLY CHICK BLASTODERMS.

—Thomas E. Hunt, University of Alabama.

A series of chorio-allantoic grafts was obtained from various regions of the pellucid area of chick blastoderms from which the entodermal layer had been completely removed. Gut and liver appear in over three-fourths of the grafts from blastoderms of the pre-primitive streak and short primitive streak stages. The frequency of occurrence of gut drops to less than half and liver rarely develops in grafts from blastoderms with streaks 1.5 to 2 mm. in length. Grafts from still older stages show typical gut only occasionally and liver has not yet been found. Grafts of the area pellucida

*No abstract was furnished for this paper.

lateral to the primitive streak show a gut-like formation with muscular tunics in about one-fourth of the cases. Other structures usually considered to be of entodermal origin have not been observed. In addition to gut and liver the structures thus far identified in the grafts of even the earliest stages studied include: Parts of the brain and eye, ganglia, notochord, heart, cartilage, skeletal muscle, skin and feather germs. Additional structures appear in grafts from the older blastoderms. Grafts of the entoderm (or entoderm with some mesoderm) of the younger stages failed to yield any differentiation in forty transplants to viable hosts. With older stages, as Willier has also found, gut-like epithelium appears in thirteen grafts out of 113 trials. Liver, thyroid and heart are also present in a few cases.

EXCRETORY UROGRAPHY.

—F. Thomas Boudreau, M.D., Mobile, Alabama.

Terminology of the title. Varieties of drugs used for excretion urography, advantages and disadvantages of the newer and older ones. Dosage and technique of administration. Types of cases that are best suited for excretory pyelography. Advantages over retrograde urography. Part played by it in general medicine and surgery as a diagnostic procedure in abdominal tumors, contraindications of excretory urography.

THE ETIOLOGY OF GOITER.

—Howard R. Mahorner, M.D., New Orleans, Louisiana.

The oldest tenable theory of the cause of goiter is iodine deficiency. In 1888 William Stewart Halsted found hypertrophy of the thyroid gland after infection. Cole and Womack found infection after induced infection in dogs. McCarrison (1917) thought that goiter was a filth-borne disease. Golyakowski (1899) found increased heat production in dogs after ligation of suprarenal blood supply, and Marine and Bauman (1921) noted that removal or injury of the adrenals of rabbits resulted in elevated metabolic rate. Attention has been called to the fact that psychic strain often precipitates the onset of goiter, and Cannon, and later Wilson, produced changes in the gland by stimulating sympathetics. Graves thought exophthalmic goiter occurred in people with thymaco-lymphatic constitution. Goiterogenic diets have been described. Most convincing evidence has been presented by Helwig, Hibbard, and Thompson that high-calcium low-iodine diets produce a high percentage of goiter in animals.

The author implanted infected foreign bodies in dogs after removing a control section. At subsequent intervals up to sixty-four days no change in the thyroid was found. In another series of dogs the adrenals were crushed or frozen, but no gross or microscopic evidence of hyperplasia of the thyroid could be found even after intervals up to one hundred and twenty-seven days.

"HONEY-DEW" FROM THE LIVE OAK AS A CAUSE OF HAY FEVER AND ASTHMA.

—Geo. H. Fondé, M.D., Mobile, Alabama.

Attention is directed to a new source of air-pollution in "honey-dew", a sap-like fluid, extracted from the leaves of live oak by the insect pests of the order of Hemiptera, which is ejected in the air, forming abundance of droplets which show upon glass windshields of cars. The "honey-dew" from the live oak evergreen foliage insects may appear at any time when balmy weather or extra flow of sap invites the thrift of these pests, there-

fore desensitization would require early treatment and perennial doses in oak sensitization subjects. An antigen made from the oak sap obtained from the juicy bark of the trunk of the tree is found to yield better skin reaction and better symptomatic relief in a limited trial by the author.

INTRAVENOUS UROGRAPHY.*

—Emmett B. Frazer, M.D., Mobile, Alabama.

MEDICAL EDUCATION FOR ALABAMA.

—Stuart Graves, M.D., University of Alabama.

Alabama, in a peculiar way, needs a four-year medical school. There is in the making in America a new type of family doctor, who will be a thoroughly competent medical advisor to families of moderate means in the average community. Studies in recent years have shown decided tendencies toward mass treatment of the poor in so-called charity hospitals. The family of moderate means has been too poor for the one and too proud for the other. There is crying need for more men who desire to be ethical family doctors, thoroughly trained to diagnose accurately and treat efficiently the more common diseases, physicians capable of *remaining in charge* of cases and correlating the services of specialists.

The completion of the medical school in the University of Alabama with a properly administered teaching hospital for the clinical branches, in which such a type of doctor can be educated largely from the youth of our own State, will constitute not only the most dependable assurance of the best medical care for the *people* of the State, but also the *surest protection* of the *medical profession* against any *threat* of "State Medicine" with its attendant evils for both patients and doctors.

BLOOD SUGAR STUDIES FOLLOWING HYPOPHYSECTOMY AND EXPERIMENTAL LESIONS OF THE HYPOTHALAMUS.

—A. D. Keller and M. C. D'Amour, University of Alabama.

Houssay and Biasotti (Endocrinol., 1931, 15, 511) have recently demonstrated that the classical symptoms accompanying "cachexia hypophysioprivea" are associated with hypoglycemia and further that dramatic recovery from the state of "cachexia hypophysioprivea" is obtained by administering glucose.

Aside from verifying Houssay and Biasotti's observations we have also encountered typical "cachexia hypophysioprivea" in dogs following experimental lesions placed in the brain just dorsal and anterior to the optic chiasm. In these experiments no injury to the hypophysis could be detected grossly or histologically. Glucose administration effects the same dramatic recovery as it does following hypophysectomy.

MOUNTING GROSS SPECIMENS IN NATURAL COLORS.

—I. Milton Wise, M.D., Mobile, Alabama.

Method suggested by Dr. J. E. Davis, Detroit College of Medicine and Surgery.

A cell, 5 x 7 inches, is made by placing two plates of photographic glass, one on either side of a piece of linoleum, the plates extending one-quarter-inch past the linoleum all around. A brass strip is applied against the linoleum edge between the free edges of the glass plates on three sides. The groove outside the brass strips is filled with asphalt and allowed to

*No abstract was furnished for this paper.

harden. The linoleum is removed. Thine slices of tissue, such as liver or spleen, after being fixed in Pick's fluid (formulas given) and sliced evenly, are mounted in the cell in a 50 per cent cane sugar solution saturated with Thymol. Preservation of color and proper fixation of the tissues depend first on maintaining the chemical concentration of the solution, and second, on the time element of fixation.

OTOMYISIS: AN INVESTIGATION OF EFFECTIVE FUNGICIDAL AGENTS IN TREATMENT.

—Ralph McBurney, M.D., University, and Harvey B. Searcy, Tuscaloosa, Alabama.

A short review of the literature was given, including a discussion of the various factors involved in mould infections of the outer ear. Symptoms with various methods of treatment used in the past as well as recent methods introduced by the authors were considered.

The effect of some twenty-eight substances, tried out clinically by the authors, and a comparison of these substances upon various types of moulds the authors have isolated from cases were reported upon.

The prime object of the investigation was to find effective fungicidal agents that may be used clinically with maximum effect but producing minimum discomfort to the patient.

Results of the investigation so far indicate clearly that a 2 per cent solution of Thymol in 70 per cent alcohol or that a mixture of Thymol, gr. V; Cresatin and 70 per cent alcohol equal parts, dr. II, fulfill these requirements both clinically and in vitro.

Various so-called ring worm remedies; alcohol alone, in various strengths, phenol and others, exert little effect as fungicidal agents in strengths that may be withstood without discomfort to the patient.

FORMATION OF BONE BY PERIOSTEUM AFTER EXPERIMENTAL INFARCTION BY EMBOLISM OF THE FEMUR IN RABBITS.

—G. H. Kistler, University of Alabama.

Infarcts were produced in the femur of young and adult rabbits by injecting through its nutrient arteries a particulate suspension of charcoal in 5 per cent gum acacia. The emboli produced marked necrosis of the medullary tissues and inner one-fourth to one-half of the cortex. This was followed by the formation of a wide layer of compact new bone outside the cortex that seemed to envelop the infarcted portion of the shaft and it was always well delimited from the pre-existing living bone. The thickness of this involucre varied from a few layers of bone cells to that of the original cortex, and most marked osteogenesis and revascularization of necrotic bone occurred at the attachment of muscles and tendons. In some regions the entire cortex was necrotic without new bone formation as if some of the soft tissues about the femur had been infarcted inadvertently. The new periosteal bone was essentially like the cortex but its Haversian systems were more irregularly arranged and the bone cells varied in size and shape. The tissues were also slightly less compact due to more abundant and larger canaliculi and blood vessels. Near the ends of the infarcted regions new endosteal bone replaced the inner devitalized cortical bone and in places the combined thickness of old cortical and new periosteal and endosteal bone was three times that of the cortex of the control femur.

THE PSYCHIC TRAITS OF THE CHRONIC UNDULANT FEVER PATIENT.

—Eugene Thames, M.D., Mobile, Alabama.

In the rural sections of the South a large percentage of the population shows a physical debility. This State is also characterized by a peculiar mental condition. Chronic undulant fever is advanced as a cause for this. This study is based upon eighty cases, all showing positive skin tests for undulant fever. One-half of these cases were submitted to the Board of Health and two-thirds of these gave positive low titer agglutinations. The typical case is described as being visibly crippled because of muscular rheumatism and as having a reddened atrophic expressionless face, especially the upper portion. The patient often manifests chorea. The disfunction of the muscles is described as being so great that bodily activities no longer have automaticity but the movements of the limbs can only be carried out by a fixation of the attention on each movement individually. This creates a terrible cerebral fatigue and renders it impossible for the patient to do two things at once. This engenders a severe psychoneurosis characterized by unstable emotions, anxiety neurosis, obsessions and phobias. The entire condition is spoken of as a neurosis. While some of these patients are confined in insane asylums, the writer contends that they have not the permanency of psychoses. They usually simulate the two types of dementia praecox. So-called sleeping sickness wherein the patient sleeps at any hour of the day and may go to sleep while walking is described as being due to intense cerebral fatigue. In conclusion the belief is expressed that even the worst cases are curable.

PYORRHEA ALVEOLARIS: ETIOLOGY, PREVENTION AND TREATMENT.

—C. B. Fowlkes, D.D.S., Mobile, Alabama.

Pyorrhea is a chronic disease of adult life, though it is sometimes found during the adolescent period and when present is due to some systemic disturbance.

It is a localized infection but may seriously affect the general health. Its chief characteristic is progressive destruction of the alveolar process which begins at the alveolar crest and slowly advances toward the apices of the roots until the teeth are exfoliated unless corrections are made. With this destruction pockets are formed about the teeth, tooth mobility begins, gum tissues become involved and bacterial invasion follows. These pockets are lined with a raw granulating gum tissue on one side and on the other the denuded root surfaces of the teeth are covered by calculus and necrotic pericementum. It has been estimated that an average case of pyorrhea will present from seven to ten inches of ulcerating surface from which bacteria may be absorbed.

Its etiology has been outlined as follows: (1) Metabolic disturbance affecting the bone and gum tissues; (2) low gum tissue resistance; (3) bacterial infection. Its treatment may, in a few words, be as follows: Through curettage remove all infectious materials, correct traumatic occlusion and build up gum tissue resistance. To prevent, see that the diet contains vitamins A, C and D for good bone formation during the growth period, correct the first signs of inflamed gum condition, through a definite brush technique keep the teeth clean and gums stimulated for healthy circulation and chew hard, coarse foods to exercise the teeth.

THE VENOM APPARATUS OF THE SPIDER *LATRODECTUS MACTANS*.

—Gerald G. Goldenberg, University of Alabama.

The venom apparatus of the male and female spiders *Latrodectus mactans* consists of four principal parts, namely: (1) The true secretory glands; elongated buff colored sacs located beneath the dorsal wall of the cephalothorax; (2) the chelicerae, appendages located on the anterior extremity of the head; (3) the excretory ducts, running within the chelicerae from the sac to the claw, and (4) the claws, located upon the distal extremity of the chelicerae.

Histologic examination of a transverse section shows the secretory gland to be composed of four tissue layers. These are, from without inward: (1) A thin membrane; (2) rectangular blocks of transverse striated muscle fibers, separated by lamellae of connective tissue; (3) a thin circular layer of connective tissue; (4) a layer of syncytial secretory cells of several types.

The venom elaborated by the secretory cells is conveyed from the gland by the non-muscular excretory duct through the chelicera to the tip of the claw, where it is released into the tissues of the victim.

SPIDER POISONING: EXPERIMENTAL STUDIES OF THE BITE OF THE *LATRODECTUS MACTANS* IN ANIMALS AND MAN.*

—Allan W. Blair, M.D., University of Alabama.

STRABISMUS.

—J. D. Perdue, M.D., Mobile, Alabama.

Strabismus is a condition of the eyes in which the visual axis of one eye is deviated from the point of fixation and, as a result, both eyes do not see an object at the same time. There are many varieties of strabismus; divergent, vertical, alternating, periodic, etc.

The condition should be treated early. As soon as two years of age, treatment should be started by efforts aimed at developing the use of the non-fixing eye, which may sometimes be accomplished by occluding the fixing eye. Exercises for strengthening the muscles of the squinting eye are at present giving great success in correcting these conditions. Errors of refraction are practically always present in strabismus and should be corrected by the proper glasses.

If these methods of treatment have not proved successful by the time the patient is six years of age, operative intervention should be resorted to. The development of the eye must be accomplished before the age of ten or twelve years, since after that time the retina does not respond well to use.

TOLERANCE FOR NEMBUTAL IN GUINEA PIGS FOLLOWING REPEATED ADMINISTRATION OF THIS DRUG.

—Emmett B. Carmichael and Louis C. Posey, University of Alabama.

An aqueous solution of nembutal was injected intraperitoneally into guinea pigs to determine whether they had a tolerance for the drug. The animals were divided into two groups: (1) Those receiving the drug twice weekly, and (2) those receiving it daily. With doses varying from 7.5 to 20 mg., per kilo body weight, there was definite tolerance shown in both

*No abstract was furnished for this paper.

groups. The minimum fatal dose (M. F. D.), the amount that killed about 90 per cent of the animals, was found to be 60 mg. per kilo body weight. The weight of the animal greatly influenced the length of the hypnotic state, the heavier pig having the longer periods of hypnosis, when the same size dose per kilo body weight was injected.

A STUDY OF THE MYELINATED AND UNMYELINATED FIBERS IN THE VAGUS NERVE OF THE CAT.

—James O. Foley, University of Alabama.

Adjacent sections of the same vagus nerve above and below the nodose ganglion, of the superior laryngeal and the pharyngeal nerves have been stained by the osmic acid and Davenport silver methods. In the silvered sections the fine unmyelinated fibers of the vagus and its branches are demonstrated with clarity. Numerical analyses of both types of preparations show that a large proportion of the fibers in the superior laryngeal and a majority in the pharyngeal nerves are myelinated, while those in the trunk of the vagus above and below the nodose ganglion are predominantly unmyelinated.

VERTIGO.*

—J. Gillis Sanders, M.D., Mobile, Alabama.

DEMONSTRATIONS

A Convenient Apparatus for Rapid and Accurate Tubing of Culture Media.

—Elizabeth Searcy Porter, Department of Pathology and Bacteriology, University of Alabama.

PROGRAM OF THE ALABAMA JUNIOR ACADEMY OF SCIENCE

SATURDAY, MARCH 10, 1934
SPRING HILL HIGH SCHOOL
Auditorium

Opening remarks by President W. R. Hubler.

Dr. R. S. Poor, Birmingham-Southern College, "The Geologic Making of Alabama".

BUSINESS SESSION: Election of officers and business by the authorized delegates.

SCIENTIFIC SESSION:

1. Richard Allen, Spring Hill High School, "The Electrons in Current Electricity".
2. Dorothy Bennett, Visitation Academy, "Why Alabamines".
3. Walter Brakefield, Minor High School, "Balancing and Using an Aquarium".
4. Arthur Cook, Ensley High School, "Amateur Photography".
5. Price Foster, West End High School, "Arrow-head Collecting as a Hobby".
6. Garland Goodwin, Shades-Cahaba High School, "Basic Science Exhibits in the Hall of Science".
7. Robert Hunter, University Military School, "The Weeping Tree".
8. Willard Manry, Murphy High School, "Sciences as Hobbies".
9. Camilla O'Conner, Convent of Mercy, "Coal and Its Products".

*No abstract was furnished for this paper.

10. Herbut Reynolds, Phillips High School, "Short Wave Receiving and Transmitting Set".
 11. Ben Roberson, Ramsay High School, "The Spectroscope in Modern Analysis".
 12. Rosa Tarasco, Bishop Toolen High School, "Chemistry in the Modern World".
 13. Selma High School:
 - (a) Carl Moseley, "Taxidermy as an Aid in Interpreting Biology". (5 min.)
 - (b) Farmer Seale, "Salamanders". (5 min.)
 - (c) Max Hagedorn, "Micro-Vivarium". (5 min.)
 14. Roy Sizemore, Woodlawn High School, "The Installation of a Radio Amplifying System in High School".
 15. Grace Williams, Mortimer Jordan High School, "Artificial Method of Producing Queen Bees".
- Appointment of Committees.
Adjournment and Inspection of Exhibits.

**AUTHORIZED DELEGATES TO THE SECOND ANNUAL
MEETING OF THE ALABAMA JUNIOR ACADEMY
OF SCIENCE**

J. C. Adams	Minor High School
Dolores Barnes	Convent of Mercy
Dorothy Bennett	Visitation Academy
Edward Blankenship	Ensley High School
Ina Mae Crumley	Mortimer Jordan
George Denniston	Murphy High School
James Doyle	Spring Hill High School
Bernice Franke	Shades-Cahaba High School
Russell Lanier	Ramsay High School
Bert Milling	University Military
Carl Moseley	Selma High School
Albert Jackson	Phillips High School
Robert Knapp	Woodlawn High School
Regina Rapier	Bishop Toolen School
Charles Scruggs	West End High School

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PROF. L. M. HARRISON.....	Woodlawn High School Birmingham, Alabama
PROF. H. A. FLOWERS.....	State Teachers College Florence, Alabama

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DeJarnette, David (C).....	University, Ala.

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 Hood, Frank C. (C) _____ Weather Bureau, Montgomery, Ala.
 †Howe, Mary _____ Judson College, Marion, Ala.
 Hunt, T. E. (F) _____ University, Ala.
 Ingram, Lillian (F) _____ University, Ala.
 †Jones, Ernest V. (B) _____ Birmingham-Southern College, Ala.
 †Jones, H. D. (B) _____ Auburn, Ala.
 †*Jones, Walter B. (C) _____ University, Ala.
 †*Jones, Walter C. (F) _____ T. C. I. Hospital, Fairfield, Ala.
 Kassner, J. L. (B) _____ 1000 13th St., Tuscaloosa, Ala.
 †Kaufmann, B. P. (A) _____ University, Ala.
 Keller, Allen Dudley (F) _____ University, Ala.
 Keller, H. S. (G) _____ Phillips High School, Birmingham, Ala.
 †Kennedy, J. J. (F) _____ University, Ala.
 Kistler, Gene H. (F) _____ University, Ala.
 Lang, E. C. (A) _____ Spring Hill College, Ala.

- Leonard, Lillian B. (F)..... University, Ala.
 †Littlejohn, W. S. (F)..... Birmingham, Ala.
 *Lloyd, S. J. (B)..... University, Ala.
 *Loding, H. P. (A)..... 166 Houston St., Mobile, Ala.
 Mackenzie, J. T. (B)..... 4300 9th Court, S., Birmingham, Ala.
 Martin, H. M. (B)..... Auburn, Ala.
 Matthews, George W. (F)..... Birmingham, Ala.
 McBurney, Ralph (F)..... University, Ala.
 McGlamery, Winnie (C)..... University, Ala.
 McVay, T. N. (B)..... University, Ala.
 Mobley, Willard M. (B)..... A. B. C., Tarrant, Ala.
 Montgomery, J. P. (B)..... University, Ala.
 Moore, W. A. (E)..... Birmingham-Southern College, Ala.
 †Ott, W. P. (E)..... University, Ala.
 Overton, A. G. (B)..... A. B. C., Tarrant, Ala.
 †Palmer, G. D. (B)..... University, Ala.
 †Poor, R. S. (C)..... Birmingham-Southern College, Ala.
 Posey, Louis C. (F)..... Adamsville, Ala.
 Rehling, C. J. Auburn, Ala.
 †Reinke, E. E. (A)..... Vanderbilt University, Nashville, Tenn.
 †*Robinson, J. M. (A)..... Auburn, Ala.
 *Robinson, Mary E. (A)..... 430 Princeton Ave., Birmingham, Ala.
 †*Sampey, John R. (B)..... Furman University, Greenville, S. C.
 Scott, Dorothy (A)..... University, Ala.
 Sell, William (E)..... University, Ala.
 Sizemore, Troy B. (D)..... A. B. C., Tarrant, Ala.
 Sledd, Arthur..... Judson College, Marion, Ala.
 †Smith, Septima (A)..... University, Ala.
 *Smyth, P. H. (G)..... Weather Bureau, Montgomery, Ala.
 †Spieth, Alda May (A)..... Teachers College, Livingston, Ala.
 Stone, Paul T. (B)..... Huntingdon College, Montgomery, Ala.
 Sullivan, Geo. J. (F)..... First Nat'l Bank Bldg., Mobile, Ala.
 Swann, Theodore (D)..... Brown-Marx Bldg., Birmingham, Ala.
 Tellier, A. J. 153 S. Monterey St., Mobile, Ala.
 Thomas, Gerald A. Woodlawn High School, Birmingham, Ala.
 Towery, Thera Mae (A)..... Howard College, Birmingham, Ala.
 VanAller, T. S. (F)..... 902 Charleston St., Mobile, Ala.
 Watt, Lucille (A)..... University, Ala.
 Walker, J. H. University, Ala.
 Walsh, Mary Vincent (B)..... Visitation Academy, Mobile, Ala.
 †Westland, A. J. (E)..... Spring Hill College, Ala.
 †*Whiting, Wm. A. (A)..... Birmingham-Southern College, Ala.
 Wooley, Mary (B)..... Murphy High School, Mobile, Ala.
 †Xan, John (B)..... Howard College, Ala.
 †Yancey, P. H. (A)..... Spring Hill College, Ala.

ASSOCIATE MEMBERS

Adama, M. S.	University, Ala.
Bakst, Myron	University, Ala.
Cantey, Frank	111 Munger Ave., Birmingham, Ala.
Grant, Charles P.	University, Ala.
Gray, Joe	1140 S. 13th St., Birmingham, Ala.
Howard, Elmer E.	University, Ala.
Huff, Nelwyn	Birmingham-Southern College, Ala.
Johnson, G. B.	Auburn, Ala.
Johnson, John A.	Birmingham-Southern College, Ala.
Keoughan, Modesta Lopez	Spring Hill College, Ala.
Lamar, Jule	Birmingham-Southern College, Ala.
Missback, George E.	University, Ala.
Muhlberg, Victor E.	University, Ala.
Renger, J. J.	University, Ala.
Rushing, Edward D.	University, Ala.
Simmons, Woodrow W.	913 4th Terrace, W., Birmingham, Ala.
Tribby, Wm. W.	University, Ala.
Walsh, Genevieve	1664 Spring Hill Ave., Mobile, Ala.
White, Wm. E.	University, Ala.
Wood, Ralph McLemore	1219 17th Ave., S., Birmingham, Ala.
Youngblood, Robert W.	1530 N. 33rd Ave., Birmingham, Ala.

*Charter members of the Alabama Academy of Science. The complete list so far as it is known was published in Volume V of the JOURNAL, p. 8.

†Member A. A. A. S.

The letters (A), (B), (C), (D), (E), (F) and (G) indicate: (A), Biology; (B), Chemistry; (C), Geology, Anthropology and Archeology; (D), Industry and Economics; (E), Mathematics; (F), Medicine; (G), Physics, as the chief field of interest of the member.

THE NEW YORK ACADEMY OF SCIENCES
- 77th Street & Central Park West
- NEW YORK, N. Y.

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THE
ALABAMA HISTORICAL
(GENERAL HISTORY)

THE JOURNAL

of the

ALABAMA ACADEMY
OF SCIENCE

(Affiliated with A. A. A. S.)

JULY, 1935

VOLUME 7

PROCEEDINGS

of

THE TWELFTH ANNUAL MEETING

FLORENCE STATE TEACHERS COLLEGE

APRIL 12 AND 13, 1935

Office of the Editor

BIRMINGHAM-SOUTHERN COLLEGE

Birmingham, Alabama

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OFFICERS OF THE ACADEMY

1935 - 1936

- President*, A. G. OVERTON
 Alabama By-Products Corp., Tarrant, Ala.
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 State Geological Survey, University, Ala.
- Vice-Presidents*:—
- C. M. FARMER State Teachers College, Troy, Ala.
 B. F. CLARK Birmingham-Southern College, Ala.
 T. G. ANDREWS University, Ala.
 W. M. MOBLEY Alabama By-Products Co., Tarrant, Ala.
- Secretary*, SEPTIMA SMITH University, Ala.
- Treasurer*, B. F. CLARK Birmingham-Southern College, Ala.
- Councilor to A. A. A. S.*, P. H. YANCEY
 Spring Hill College, Ala.
- Editor of Journal*, E. V. JONES
 Birmingham-Southern College, Ala.

1934 - 1935

- President*, R. S. POOR Birmingham-Southern College, Ala.
- Vice-Presidents*:—
- T. E. HUNT University of Alabama
 C. A. BASORE Alabama Polytechnic Institute
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- Secretary*, P. H. YANCEY Spring Hill College, Ala.
- Treasurer*, A. G. OVERTON Tarrant, Ala.
- Editor*, E. V. JONES Birmingham-Southern College, Ala.
- Councilor to A. A. A. S.*, E. B. CARMICHAEL University, Ala.

Past Presidents

WRIGHT A. GARDNER (2 terms)	Auburn	1924-1926
STEWART J. LLOYD	University	1926-1927
JOHN R. SAMPEY	Howard College	1927-1928
WALTER C. JONES	Birmingham	1928-1929
FRED ALLISON	Auburn	1929-1930
EMMETT B. CARMICHAEL	University	1930-1931
GEORGE J. FERTIG	Birmingham	1931-1932
J. F. DUGGAR	Auburn	1932-1933
J. L. BRAKEFIELD	Howard College	1933-1934
R. S. POOR	Birmingham-Southern College	1934-1935

GENERAL PROGRAM

Twelfth Annual Meeting

Florence State Teachers College

April 12 and 13, 1935

Friday, April 12

- 8:30 A.M. *Registration* in Bibb Graves Hall. Secure banquet tickets. Register for Saturday field trips.
- 10:30 A.M. Executive Committee meeting, Bibb Graves Hall.
- 11:15 A.M. Preliminary Business Meeting.
- 11:50 A.M. *Photograph* in front of Bibb Graves Hall.
- 1:30 P.M. *Section Meetings* in Bibb Graves Hall.
 Section I. Biology and Medical Science.
 Section II. Chemistry, Physics, and Mathematics.
 Section III. Geology, Anthropology, and Archeology.
 Section IV. Industry and Economics.
- 5:00 P.M. Final Business Meeting, Bibb Graves Hall.
- 7:00 P.M. *Annual Banquet*, Dining Room, O'Neal Hall.
 Dr. Walter B. Jones, Toastmaster.
- 7:45 P.M. *Public Addresses*, O'Neal Hall.
 Address of Welcome, Dr. H. J. Willingham, President,
 Florence State Teachers College; Chairman, Florence
 Chamber of Commerce.
 Response by Walter B. Jones, Vice-President of the Acad-
 emy.
 Presidential Address, "The South's Position in the Mineral
 Industry," Dr. R. S. Poor, Birmingham-Southern Col-
 lege, President of the Academy.
- 9:00 P.M. *Public Reception*, Reception Room, O'Neal Hall.

Saturday, April 13

- 6:00 A.M. *Geological and Archeological Field Trip* directed by
 Dr. Walter B. Jones, State Geologist, University, Alabama.
- 8:00 A.M. Meeting of Junior Academy, Wesleyan Hall.
- 9:00 A.M. *Section Meetings* for Sections I and II.
- 12-1:00 P.M. *Barbecue Luncheon on College Campus*, Compli-
 ments of President H. J. Willingham.
- 1:00 P.M. *Industrial Trip* to Wheeler Dam, TVA Nitrate
 Plant, and Wilson Dam directed by Dr. F. F. Cunningham,
 Florence State Teachers College.

THE MEETING OF THE EXECUTIVE COMMITTEE, APRIL 12, 1935

The meeting was called to order at 10:30 A.M., by R. S. Poor, President of the Academy, who handed to the secretary an outline of business for the meeting.

1. Attention was called to the necessity of pushing the program on schedule time due to two field trips planned for Saturday.

2. The vice-presidents of the various sections were urged to appoint a secretary, if one had not been elected, who should keep minutes and secure abstracts of all papers presented and turn these over to the Secretary of the Academy at the end of the meeting.

3. The need for a revision of the constitution and by-laws was discussed and the following committee was appointed for this purpose: P. H. Yancey, Chairman; E. B. Carmichael, J. L. Brakefield, A. G. Overton, E. V. Jones.

4. The report of the special committee on the merging of the Biology and Medical Sections was presented and discussed. This report which had been approved by the Executive Committee by a letter vote recommended the merging of these two sections for the current year. The Executive Committee voted to recommend to the Academy that this merger be permanent.

5. It was voted on motion of Dr. Brakefield that the annual address of the President of the Academy be published in full in the Journal if he so desires.

6. The Atlanta meeting in regard to the formation of a Southeastern Division of the A. A. A. S. was discussed. The request of Dr. Boyd (Chairman of the committee on the proposed Southeastern Division) that we appoint a member to represent our Academy on the general committee was approved and the Chairman was asked to report this action to the Academy.

7. The editor of the Journal was asked to outline plans for future publications. He proposed that the next volume be published soon after the present meeting and another volume carrying the program and, if possible, the abstracts just before the next annual meeting. It was pointed out that, due to earlier publication of the last volume, we had paid for two volumes out of the present year's income and that the proposed plan would involve additional increases in our expenditures. The committee felt that the above plan for publication should be carried out in full.

8. The question of organizing local branches of the A. A. A. S. was discussed and Professor Yancey told of the

organization of the Mobile Academy of Science and asked for an expression of opinion as to the affiliations of such branches of the Academy. The matter was discussed but no action was taken.

9. Dr. Carmichael spoke of the possibility of a change in the policy of the A. A. A. S. with reference to refunds made to state Academies. After considerable discussion it was voted to instruct the Secretary to write the A. A. A. S. (I) that the Alabama Academy of Science is in favor of a continuance of the refund but (II) if the policy is changed to assign this money to grants-in-aid the Academy would be ready to administer these grants.

10. Mr. Overton reported on the plan for incorporation of the Academy. The committee approved his recommendation that incorporation not be pushed at this time and he was instructed to present the matter again next year.

MINUTES OF THE TWELFTH ANNUAL MEETING OF THE ALABAMA ACADEMY OF SCIENCE AT FLORENCE STATE TEACHERS COLLEGE, APRIL 12 AND 13, 1935

The meeting was called to order by Dr. R. S. Poor, President of the Academy, at 11:30 A.M. The minutes of the previous meeting were read and approved. The Treasurer's report was accepted and referred to the auditing committee.

The report of the committee on amendment to Article IV of the Constitution was accepted. The recommendation of the committee was as follows: "Beginning with the year 1935 the Alabama Academy of Science shall adopt the plan of selecting the President-Elect."

The recommendation of the Executive Committee to perpetuate the merger of the sections of Biology and Medicine into one section as "Biology and Medical Science" was approved.

Mr. Overton reported on the incorporation of the Academy. His report was accepted.

Professor Flowers reported on the Junior Academy and Dr. Cunningham reported for the committee on arrangements. The following committees were appointed and instructed to report at the final business session at 5:00 P.M.

1. Resolutions Committee: J. L. Brakefield, Chairman; J. Paul Reynolds.
2. Committee on Place of 1936 Meeting: A. G. Overton, Chairman; S. J. Lloyd, B. F. Clark.
3. Nominating Committee: J. H. Coulliette, Chairman; E. B. Carmichael, J. R. Cudworth, S. J. Lloyd, C. M. Farmer.

4. Auditing Committee: (a) for the Senior Academy: John Xan, Chairman; C. R. Hixon. (b) for the Junior Academy: H. A. Flowers, Chairman; A. G. Overton.

The following standing committees were appointed:

1. Committee for Revision of the Constitution and Revision of Membership Roll: P. H. Yancey, Chairman; E. V. Jones, E. B. Carmichael, A. G. Overton, J. L. Brakefield.

2. Committee on Incorporation: A. G. Overton.

The Editor of the Journal made his report which was accepted. (Report appended.)

The meeting adjourned until 5:00 P.M.

Minutes of the Second Business Session

The meeting was called to order at 5:10 P.M. by President R. S. Poor.

Dr. E. B. Carmichael, Councilor to the A. A. A. S., made his report, which was accepted. (Report appended.)

Dr. J. L. Brakefield reported on his trip to Atlanta to attend a meeting for the purpose of organizing a Southeastern Division of the A. A. A. S. (Report appended.) On his motion the Academy pledged itself to favor the organization of such a division. (Dr. Brakefield was later appointed as our representative on the Southeastern Division Committee. Editor.)

Professor P. H. Yancey moved that in the future the Editor of the Journal handle all printing for the Academy. This was seconded by Mr. Overton and carried.

The report of the Auditing Committee for the Senior Academy was read by Dr. Hixon and accepted. (Report appended.)

The report of the Resolutions Committee was read by Dr. Brakefield and accepted. (Report appended.)

The committee on place of meeting for 1936 reported two invitations, one from Troy State Teachers College and another from Alabama Polytechnic Institute. The committee recommended the latter place. The report was adopted.

The Nominating Committee submitted the following names:

President, A. G. Overton.

President-Elect, W. B. Jones.

Secretary, Septima Smith.

Treasurer, B. F. Clark.

Editor of the Journal, E. V. Jones.

Councilor to the A. A. A. S., P. H. Yancey.

Dr. Brakefield moved that the nominations be accepted. Protests were offered by Mr. Overton and Dr. Clark requesting that their names be withdrawn. After discussion the motion was adopted, and the above officers were declared elected.

The officers of the sections were announced as follows:

Section I. Biology and Medical Science:

Vice-President, C. M. Farmer; Secretary, Margaret Hess.

Section II. Chemistry, Physics, and Mathematics:

Vice-President, B. F. Clark; Secretary, _____

Section III. Geology, Anthropology, and Archeology:

Vice-President, T. G. Andrews; Secretary, David T. DeJarnette.

Section IV. Industry and Economics:

Vice-President, W. M. Mobley; Secretary, _____

The date of the next meeting was left to the Auburn authorities and the Executive Committee. It was suggested that a March meeting would be more suitable because of many National meetings coming in April.

Dr. Poor, the retiring President, thanked the members for their cooperation and expressed his good wishes for the continued success of the Academy.

The meeting adjourned at 5:55 P.M.

(Signed) P. H. YANCEY, Secretary.

REPORT OF TREASURER

For the Year Ending April 11, 1935

Receipts

Balance on hand March 8, 1934, Tarrant American Savings Bank.....		\$209.36
Membership fees received during year.....	\$243.00	
American Association for the Adv. of Science	16.00	
Reprints of Abstracts (3-27-34).....	11.80	
Collected on abstracts (3-18-35).....	17.35	288.15
		<hr/>
		\$497.51
Accounts Receivable—Dr. Septima Smith.....		10.94
		<hr/>
		\$508.45

Disbursements

Postage—

A. G. Overton.....	\$ 10.00
T. E. Hunt.....	1.92
W. A. Whiting.....	6.50
W. A. Whiting (Dr. Dubois)....	5.13
C. A. Basore.....	1.50
E. B. Carmichael.....	2.18

R. S. Poor.....	7.48	
P. H. Yancey.....	17.49	
E. V. Jones.....	6.00	
Robt. Lee Knapp, President, Junior Academy..	2.73	
		\$ 60.93
Programs (C. W. Cather) 3-8-34.....	20.00	
Diplomas Junior Academy—Howard Burton..	5.00	
Refreshments—Spring Hill College.....	2.11	
Journal (300 copies \$142.50, Reprints (200 of Ab. \$11.00) Birmingham Printing Co. (3-23-34)	153.50	
Ditto—Birmingham Printing Co. (3-18-35) (300 copies Journal \$131.10, 15 reprints of Ab. 24.94)	156.04	
Patterson Printing Co. (envelopes).....	2.00	
Stationery (Heiter-Starke Printing Co., Inc.)	13.65	
Stationery (Spring Hill College Sta. Store)....	.43	
Publication of Journal Expenses (E. V. Jones).....	7.00	
Ala. Ind. & Scientific Soc. Bound (E. B. Carmichael).....	3.32	
Typing Journal (1935 Journal).....	3.70	
Stamp—Osce Roberts Stamp & Printing Co. Inc. (E. V. Jones).....	.75	
Telephone Calls (R. S. Poor).....	1.76	
Telephone Calls (R. S. Poor) (Tuscaloosa)....	1.20	
Trip to Florence—(Dr. R. S. Poor).....	2.86	
Trip to Atlanta—(Dr. J. L. Brakefield).....	8.00	
Tax on checks (Tarrant Amer. Savings Bank)	.42	
1 Photo (Dr. Yancey) 3-20-34.....	.75	
Stationery (Dr. Yancey) 3-9-34.....	2.25	
		\$445.67
Balance Tarrant Amer. Sav. Bank \$53.04		
less \$1.20.....	51.84	
Accounts Receivable—Dr. Septima Smith....	10.94	\$508.45

(Signed) A. G. OVERTON, Treasurer.

Audited and found correct:

Auditing Committee:

CHAS. R. HIXON,

JOHN XAN, Chairman.

REPORT OF THE COUNCILOR TO THE A. A. A. S.

The last annual meeting of the A. A. A. S. was held at Pittsburgh during the Christmas holidays. The Academy Conference session opened Thursday, December 27, 1934, at 11:00 A.M., in Hotel Schenley. A luncheon was served at noon and the discussion of the following three subjects continued until 3:30 P.M.:

1. Relations of Local Branches of the A. A. A. S. to the Affiliated Academies.
2. Credit Value of Laboratory Teaching.
3. Academy Finances and Future Policy.

The first of these subjects took up considerable time in the council meeting as well as in the Academy Conference. The A. A. A. S. plans to organize "Local Branches" in the large cities and thickly settled sections of the country. The relation of these local branches to the affiliated state academies has not yet been determined, but Dr. Cattell in an article in *Science* (Dec. 21, 1934, pp. 576) says "these (local branches) may become the units in a state organization, perhaps under the auspices of the State Academies of Science." The purpose of the local branches is to have a common meeting ground for the scientists and those who either are not following scientific lines or who are interested in science as an avocation.

The credit value of laboratory teaching was given in the form of a report. A copy is available for inspection.

The third subject under discussion, Academy Finances and Future Policy, is of particular interest to the Academies, since it had to do with the fifty cents per member that the A. A. A. S. allows the Academies. It was suggested that this per capita fund would probably be withdrawn in the near future, but that the Council might consider allotting a corresponding amount to each academy if it were distributed as a research fund to active investigators within the respective states.

The membership in the A. A. A. S. had a net gain of 4 members from October 1, 1933, to September 30, 1934.

The reports of the Treasurer and Permanent Secretary of A. A. A. S. are available for inspection.

(Signed) EMMETT B. CARMICHAEL, Councilor.

**REPORT OF THE REPRESENTATIVE AT THE
ATLANTA MEETING OF PROPOSED SOUTH-
EASTERN DIVISION OF THE A. A. A. S.**

The meeting was presided over by Dr. George H. Boyd of the University of Georgia. Representatives from Virginia, North Carolina, South Carolina, Georgia, Alabama, and Tennessee discussed the matter of the organization of a South-eastern Division of the A. A. A. S. No definite steps were taken other than to appoint Dr. Boyd as Chairman of a committee which is to be made up of representatives from the various state Academies. It was the opinion of some that those who attended the meeting should comprise the committee, but it appeared to others of us that since many of the state Academies would, within the next few weeks, elect new presidents it would be better for Dr. Boyd to explain the matter to the Academy Presidents and ask that they appoint representatives to act with him.

My impression from the discussion is that most of the southeastern states will cooperate in the forming of a division of the A. A. A. S. It is my hope that the Alabama Academy of Science will be active in the furtherance of this project.

(Signed) J. L. BRAKEFIELD.

REPORT OF THE COMMITTEE ON RESOLUTIONS

Be it resolved that the members of the Alabama Academy of Science greatly appreciate the cordial hospitality of the Florence State Teachers College as the host of the twelfth annual meeting of the Academy and that they hereby record their thanks to the administration, faculty, and the committee on local arrangements of the Florence Teachers College for their many courtesies and efficient services.

(Signed) J. PAUL REYNOLDS,

J. L. BRAKEFIELD, Chairman.

REPORT OF THE EDITOR OF THE JOURNAL

Volume VI of the Journal was mailed early in February to all regular members in good standing. Thanks are due Dr. B. F. Clark and Dr. Paul Reynolds for assistance in abstracting.

Some slight changes were made in the form of the Journal this year in the interest of economy and a very favorable rate was obtained on the printing job. But in spite of these and other economies the Treasurer's balance is steadily decreasing and we shall soon be facing financial difficulties unless our income is increased.

We have listed the regular and associate members separately, indicating the chief field of interest of each member, and have marked our charter members and our members who are also members of the A. A. A. S.

A persistent and successful effort has been made throughout the year to establish exchange relations with each state academy that issues a publication of any kind. We are especially grateful to some of the older academies for courtesies shown in exchanging their large publications for our modest journal.

We have exchanged complete files with the Colorado-Wyoming Academy, the Kentucky Academy, the Pennsylvania Academy, the Tennessee Academy, the Texas Academy, the Virginia Academy, and the West Virginia Academy.

We have also established exchanges with and sent our complete file of Journals to the Illinois Academy, the Indiana Academy, the Iowa Academy, the North Carolina Academy, the Ohio Academy, the St. Louis Academy, the Wisconsin Academy, the Butler University Botanical Library, and the Smithsonian Institution Library.

We have sent our file of Journals without exchange to the following institutions and organizations: The New Orleans Academy, the North Dakota Academy, the Alabama Department of Archives and History, the Birmingham Public Library (Department of Southern History and Literature), and the National Geographic Society Library.

Our exchange library consisting of over 150 volumes is now housed in a special section of the Paul Phillips Library Building of Birmingham-Southern College. The bound volume of the records of the Alabama Industrial and Scientific Society prepared by Dr. E. B. Carmichael is among these volumes.

Through the excellent cooperation of the Vice-Presidents and members of the Academy we secured abstracts of all but

four papers read before the Academy at the 1934 meeting. Your continued cooperation is urged in securing an abstract of every paper presented at this meeting.

(Signed) ERNEST VICTOR JONES, Editor,
Journal Alabama Academy of Science.

ABSTRACTS OF PAPERS PRESENTED

April 12th and 13th, 1935

PRESIDENTIAL ADDRESS. "THE SOUTH'S POSITION IN THE MINERAL INDUSTRY."

—R. S. Poor, Birmingham-Southern College.

Statistics show that the South has the potentialities of an independent section, but actually this position is not realized probably because the people in the South have been slow to seize upon their opportunities.

The South comprises about one-third of the land area of the United States. It produced 40% of the country's mineral values in 1932, this included more than 40% of the coal, 69% of the oil, and 68% of the total natural gas.

The South was pictured as the coming center of the country's chemical industry. 34% of the country's total crop acreage was produced in the South in 1933, and this was 43% of the country's crop value. Since 60% of all manufacturing depends upon agricultural products the South stands in a very strong position from this point of view. Very little has been done with our coal resources so far as actual chemical research is concerned. The coal-bearing land in the South is twice that of Europe and 5 times that of Europe excluding Russia. And yet chemical research has hardly touched this great resource. Scientific research has made it possible for the South to dominate the nitrate, sulphur, and phosphate industries and geologic investigations in west Texas and adjoining New Mexico have revealed a vast store of potash salts. What the South needs now is the concentrated efforts of her trained sons. We now spend one billion dollars annually on food and feed from other sections. The South was independent before the Civil War. If proper crop diversification is adopted by the farmer of the South and her native sons realize their great opportunities she will be so again.

The national mineral policy of the United States was discussed and it was shown how the arm of government has gradually been extended to protect natural resources as the properties of the people and not of the individual. Various loop-holes in, and exceptions to, the present laws were shown. Then the newly proposed mineral policy as recommended by the National Resources Board appointed by President Roosevelt was analyzed and it was shown how the suggested regulations were being favorably received by mineral operators. The passage of the proposed policy by those in authority is indicated and with its waste elimination clauses and research provisions there is every likelihood that the South will begin to realize its mineral possibilities.

BIOLOGY AND MEDICAL SCIENCE

*ADIPOSIITY WITH NORMAL SEX FUNCTION FOLLOWING EXTIRPATION OF THE POSTERIOR LOBE OF THE HYPHYPHYSIS IN THE DOG.

—A. D. Keller and Wm. Noble, University of Alabama.

In connection with studies on carbohydrate metabolism we removed the posterior lobe of the hypophysis in five mature female dogs. All showed a tendency toward adiposity (sleekness and plumpness), especially Dog 130, which developed adiposity to the extreme. Enhanced appetites were commonly present. Dog 130 drank 500 cc milk in an eight hour period and passed undigested milk through the rectum.

All dogs bred regularly every six months; since operation Dog 92 gave 2 litters of 5 pups while Dog 130 delivered a litter of 8.

After termination of Dogs 92 and 130, serial cell and fiber tract studies revealed that in 130 the pars intermedius and the infundibular process were cleanly removed with no injury to the pars anterior, the pars tuberalis, the infundibulum or the hypothalamis. In Dog 92 approximately 2/3 of the anterior lobe was removed in addition.

Previously we suspected that the adiposity was due to hypothalamic injuries alone, but the absence of such injury here forces us to conclude that when adiposity follows injuries at the base of the brain, it is the "pars intermedius—infundibular-process" complex which is primarily de-ranged.

This work was aided by a grant from the Committee on Scientific Research of the American Medical Association.

* Read by title.

BLOOD PLATELET NUMBERS IN NORMAL MEN AND WOMEN.

—Kate Malone and J. L. Brakefield, Howard College.

Since modern textbooks in physiology and histology differ so widely in their statements as to the normal number of blood platelets in man, it appeared to us that it would be of interest to determine the platelet numbers in college men and women over long periods of time.

Ten men and five women were selected for the work. Platelet determinations were made on definite days from week to week and at different periods within a day. A range of 350,000 to 400,000 blood platelets per cubic millimeter were found to be the normal numbers for the group of men studied and a range of 300,000 to 330,000 per cubic millimeter for the women. The number of blood platelets in women was consistently lower than in men.

OBSERVATIONS ON CEREBELLAR CATALEPSY IN THE DOG.

—A. D. Keller and R. S. Roy, University of Alabama.

Awkwardness in limb position with absence of "correcting" and "placing", which follows unilateral transverse pontile lesions and longitudinal midline section through the cephalic pons and caudal midbrain, has been described (Arch. of Neurol. and Psychiat., 1934, 32, 1253). The midline lesion precipitate the dysfunction bilaterally uncomplicated by other disturbance as ataxia, hypotonia, etc. As the preparation becomes chronic,

this disturbance changes in character in that, in walking, instead of dragging the dorsa of the feet or the nails, the feet are raised characteristically higher than normal off the floor, and "correcting" and "placing" returns. Since this dysfunction is strikingly prominent after complete section of the cerebellar peduncles, it seems certain that it is in the dog equivalent to Babinsky's cerebellar catalepsy in the human, particularly so since Holmes found it to be so prominent during the acute stage following gun-shot wounds.

Because of the close association of the precipitating lesions in the pons to that of the course of the brachia conjunctiva, we suspected that the disturbance was precipitated by the section of these tracts. In a comprehensive series of careful experiments we have, however, been able to section: (1) unilaterally a brachium conjunctivum; (2) the pontile brachia along the midline ventrally; and (3) to remove the cortex of the ansiformis, para-mediis, and paraflocculus cerebellar lobules without precipitating even temporarily this dysfunction. In fact the above procedures are entirely symptomless as judged by careful observation.

Whether or not the disturbance is of cerebellar origin or is entirely a brainstem function is under investigation.

THE URINOGENITAL SYSTEM OF *DIDELPHYS VIRGINIANA*.

—Laura Cannon, Birmingham-Southern College.

During the Fall of 1934 and the Spring of 1935 the urinogenital systems of 8 female and 2 male opossums obtained from Fayette, Jefferson, and Walker counties were examined. Externally the female possesses the characteristic marsupial pouch with 4 lateral and one median teat. The male system was typically mammalian, possessing a penis, and testes in a scrotal sac. Careful ventral dissections were made exposing the internal portion of the urino-genital system. The arterial system was injected; also one uterus of several specimens to determine the possible coalescence of the vaginae at their proximal ends.

From observations and study made of fresh specimens of the opossum, *Didelphys virginiana*, the following conclusions concerning the urinogenital system are made:

The walls of the vaginae at "the point of close apposition" are inseparable and give away under slight pressure allowing free passage between the vaginae.

The urino-genital portion of the circulatory system follows the general mammalian plan, but differs from higher mammals (cat and rabbit) in the following respects:

(a) The veins from the mammary glands empty into the subclavian rather than the precaval veins.

(b) The ovarian veins empty directly into the post caval. There is no outstanding asymmetry as that of the left ovarian vein emptying into the left renal vein exhibited in the cat.

(c) Whereas in higher mammals the right renal vein and artery are usually anterior to the left, in the opossum there is no regularity in this asymmetry.

(d) A small artery arising from the common iliac supplies the bladder.

CERCARIA STEPHANOCAUDA OCALANA, A NEW SUBSPECIES OF CYSTOCERCOUS CERCARIAE FROM FLORIDA; ITS LIFE-CYCLE AND DISTRIBUTION.*

—Septima Smith, University of Alabama.

Goniobasis catenaria Say is the host of a cystocercous cercaria found in several localities in the northern half of Florida and in southern Georgia. Its distribution conforms in general to that of the Ocala limestone of Tertiary age which is the source of the largest limestone springs in the United States. Throughout this area the cercaria presents constant and characteristic differences from *Cercaria stephanocauda* described by Faust, 1921, from Rome, Georgia, a region of Paleozoic limestone, which induces us to consider it of sub-specific rank. To this we give the name *Cercaria stephanocauda ocalana* nov. subsp., designating Merritt's Mill Pond, two miles east of Marianna, Florida, as the type locality.

A comparison of these two forms shows the following differential characters. All measurements are in mm.

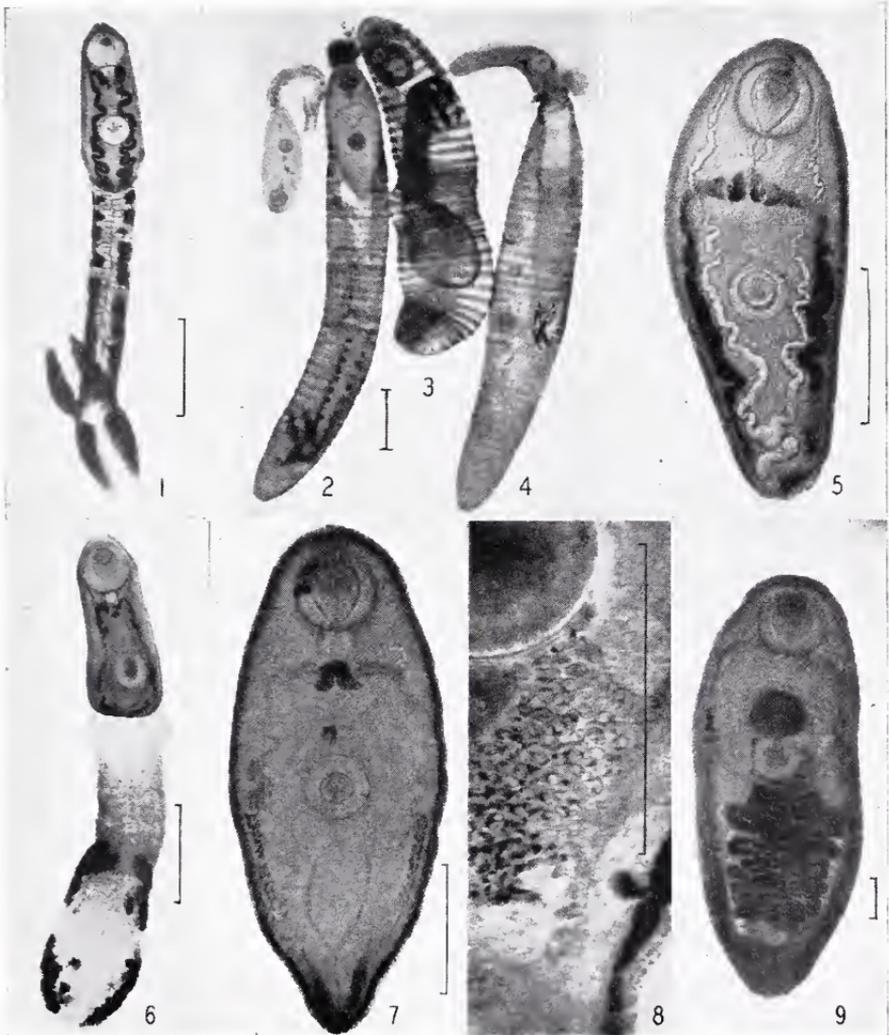
	<i>C. stephanocauda</i>	<i>C. stephanocauda ocalana</i>
Tail stem		
length	2.5 to 4.5	2.5 to 6.1
width	0.43	0.7
pigmentation	Heavily bordered	Absent
Furca		
length	1	1
width	0.60	1
pigmentation	Heavily bordered	Light, irregular patches
shape	Sharply pointed	Broadly rounded

Other characters are common. The distome of these two forms tapers posteriorly and, being too long for the "sac" in which it lies, is folded under. Flattening frequently causes it to break through this sac posteriorly and push down into the tail stem. Under ordinary laboratory conditions the time of emergence is irregularly distributed throughout the day. Both cercariae are strong swimmers, motion conforming, in general, to that of other described members of this group. An anterior and a posterior "collar", embellished with thorned papillae, especially conspicuous in the living material, are located sub-terminally on the tail trunk.

Of the naturally infected fish the black bass, *Huro floridana* (Le Sueur), was more often found to be the host, although in feeding experiments susceptibility to infection and rate of development was essentially the same in other members of the Centrarchidae. Development, which is slow, occurs in the stomach. In three months ova are produced; and in six months they are present in large numbers in a considerably enlarged distome. This is morphologically indistinguishable from *Leuceruthrus micropteri* Marshall and Gilbert, 1905. Rarely do either naturally or artificially infected fish contain more than one distome irrespective of the number of cercariae fed the latter.

Horsfall, 1934, suggests a relationship between *C. stephanocauda* and *Leuceruthrus micropteri*. The present author has proved this relationship by conducting feeding experiments with material collected from *Goniobasis* spp. in several localities in the Paleozoic areas of north Alabama, and by comparison with living cercariae obtained from the Oconomowoc River, Wisconsin, source of Horsfall's material. The adults obtained proved morphologically indistinguishable from those secured by feeding the subspecies. We have, therefore, the unique situation of two morphologically distinguishable cercariae producing adults morphologically indistinguishable. This adds emphasis to the previously expressed significance of tail characters in differentiating cystocercous cercariae.

* This research was aided by a grant from the National Research Council.



Photomicrographs of living material. All scales represent 1 mm. Fig. 1. Free swimming form of *Cercaria stephanocauda*. Fig. 2. Redia with emerged immature form of *C. stephanocauda* (the latter the stage described by Faust). Fig. 3. Redia containing cercariae of *C. stephanocauda ocalana* nov. subsp. showing "ringed" muscular nature of redia wall. Fig. 4. The same showing emerging cercaria. Fig. 5. Freshly ex-cysted distome of *C. stephanocauda* showing excretory and digestive systems with anlage of reproductive system. Fig. 6. Free swimming form of *C. stephanocauda ocalana*. Fig. 7. Thirty-eight day development of same in sunfish showing partial development of gonads, uterine coils and cirrus. Fig. 8. A portion of a distome of the same showing six-months development. Fig. 9. Large mature distome (10.8 mm. long) morphologically indistinguishable from *Leucoruthrus micropteri* recovered from stomach of large-mouth black bass in same locality in which *C. stephanocauda ocalana* was found. Adult differentiation, therefore, would depend upon a study of larval forms.

A NEW TYPE OF Y-CHROMOSOME IN *DROSOPHILA CARIBBEA* STURT.

—Berwind P. Kaufmann, University of Alabama.

In the fall of 1933 and the summer of 1934, the author collected *D. caribbea* in the vicinity of Tuscaloosa, which is considerably north of the previously known range of distribution of the species. Male flies of the Tuscaloosa stock show an unequal-armed, V-shaped Y-chromosome, whereas the stock used by Metz (1916) in the original description of the chromosomes of this species showed a rod-shaped Y. A cytological study of ganglion cells of the Tuscaloosa stock disclosed the following additional interesting points: (a) The nucleoli are found in association with the smallest of the 3 pairs of V-shaped autosomes in both male and female nuclei. In the male the Y-chromosome is also associated with the nucleolus (cf. *D. melanogaster*, Kaufmann, this Journal, vol. 6, 1934). (b) Among the autosomes the position, type and constancy of the constrictions permit identification of the second and third chromosomes, because of their similarity with those of *D. melanogaster*. (c) An abundance of tetraploid tissue was found in several individuals, male and female.

*STUDY OF TRANSLOCATIONS INVOLVING THE SECOND AND Y-CHROMOSOMES OF *DROSOPHILA MELANOGASTER*.†

—John A. Johnson, University of Alabama. Introduced by B. P. Kaufmann.

A series of seven translocations, involving the second and Y-chromosomes of *D. melanogaster* were studied cytologically, using aceto-carmin preparations of neurocytes of male larvae. In translocations A, B, and C 2-Y large fragments of the second chromosome are attached to the Y. Translocations I, J, E, and D are smaller, and are listed in the order of descending size. The breakage points of translocations A, B, C, I, and J are in the right arm of the second chromosome; D and E are in the left arm. Attachment of the translocation fragment is to the short arm of the Y-chromosome in all cases except C and I. The aceto-carmin preparations permit a more accurate determination of the positions of the breaks than paraffin sectioned material. Comparison of the cytological data with the genetic data shows that in general the genes of the second chromosome are more widely spaced in the physical chromosome than in the genetic. In the distal portion of the left arm, however, the genes seem to be closer together cytologically than the genetic map indicates.

FURTHER STUDIES ON THE ORIGIN OF THE ENTODERM IN THE CHICK EMBRYO.

—T. E. Hunt, University of Alabama.

Chick blastoderms in the early primitive streak stage were stained with Nile blue sulphate 0.2 to 0.3 mm. lateral to the primitive streak by means of the agar plate method. After 8 to 12 hours further incubation the dye was present in the streak. The blastoderm at this time was taken from the yolk and transverse strips from different levels, each about 0.5 mm. in width, were removed for examination. The cells of the germ layers and the distribution of the dye could thus be seen with a compound microscope without resorting to fixation. The dye could be seen in the

*Read by title.

†The stocks of flies for this study were secured from Prof. Th. Dobzhansky by Prof. B. P. Kaufmann.

ectodermal, mesodermal and entodermal cells of the streak of the side stained and to some extent in the mesoderm and entoderm of the opposite side. This was found to occur in the anterior and also in more posterior levels of the streak. These experiments together with those reported previously, in which entodermal structures were found to differentiate in grafts of ectoderm and mesoderm are considered to substantiate the idea that at least some of the definitive entodermal cells arise from the ectoderm or more directly perhaps from the mesoderm.

*PROTECTION BY PERIPHERAL NERVE SECTION OF THE GASTRO-INTESTINAL TRACT FROM ULCERATION FOLLOWING HYPOTHALAMIC LESIONS.

—A. D. Keller, University of Alabama.

Ulceration encountered in the stomach and duodenum following hypothalamic lesions and hypophysectomy has been essentially of two types, namely: (1) hyperemia and hemorrhage of the body of the stomach and proximal duodenum with resultant bleeding into the lumen, and (2) characteristic crater formation in the body and pylorus of the stomach and proximal duodenum.

Are these changes (1) simply and indirect result of the generalized altered physiological condition resulting from the central lesion or (2) a matter of direct hyperactivation of central groups of cells having synaptic connections with the outflow of fibers supplying the gut? Are the two types of ulceration stages in the same process or two separate and distinct mechanisms?

In answering these questions, it was found that vagotomy does not protect the gut from the hemorrhagic states and sympathectomy does not protect from crater formation; while the opposite protection is strongly indicated though not conclusively demonstrated. It is also indicated that two separate mechanisms were activated centrally, one acting via the vagi, the other via the sympathetic.

This work was aided by a grant from the Committee on Scientific Research of the American Medical Association.

*OBSERVATIONS ON THE pH OF CLOTTING AND CITRATED BLOOD.

—John H. Ferguson, University of Alabama.

The following observations were made with the co-operation of Mr. Delafield duBois, of Yale University, and by use of the sensitive duBois glass-electrode with which was employed the water-jacketed chamber for keeping the blood at 38°C. and enabling the blood pH to be determined without appreciable change in the gas tensions.

No significant pH change occurred in Rabbit heart blood during a 12-30 minute period of continuous observation although portions of each blood sample, which were placed in coagulation tubes, clotted in an average time of 4 to 6 minutes.

Blood samples were divided between two tonometers, the first being shaken with the mercury until defibrinated, the second containing 1/5 its volume of 10% trisodium citrate to prevent coagulation. The tonometers were kept at room temperature (*circa* 24°C) for 24 hours, small samples being removed at intervals for pH determinations with the glass-electrode.

* Read by title.

With improved technique we have confirmed the somewhat criticised findings of Havard and Kerridge (1929) and Laug (1934) and substantiated the earlier data on an "acid shift" in kept blood. Citrated blood was observed to be more acid than defibrinated blood preserved for the same length of time. H-electrode determinations of pH of the various citrate solutions used gave values ranging between 7.5 and 8.5. The discrepancy of an acidification instead of a possible alkalinisation when small amounts of citrate are added (to prevent blood clotting) awaits further elucidation.

*THE SEPARATION OF THE HEAT LOSS AND THE HEAT PRODUCTION MECHANISMS IN CHRONIC PREPARATIONS.

—A. D. Keller, University of Alabama.

The elimination of the heat maintenance mechanism without affecting the heat loss mechanism has been reported in acute mid-brain and hypothalamusless cats. It is evident, however, that acute preparations do not demonstrate that structures essential to heat-maintenance are located at the thalamic level or within the hypothalamus, since it would be possible for them to be located in the cephalic midbrain and be temporarily defunctioned.

The inability of (1) a completely midbrain dog (section caudal to posterior commissure dorsally and the caudal tip of the mammillary bodies ventrally) and (2) an essentially hypothalamusless dog (bilateral severance of the dorsal and caudal hypothalamic connections) to shiver and to maintain their rectal temperatures without incubation on the 28th and 32nd day after operation demonstrates that the maintenance mechanism is actually located in the hypothalamus.

Data concerning experiments with specific dogs are given, bearing out these conclusions.

This work was aided by the grant from the Committee on Scientific Research of the American Medical Association.

TYPES OF FIBERS IN THE RECURRENT LARYNGEAL NERVE OF THE CAT.

—F. S. DuBois and J. O. Foley, University of Alabama.

The recurrent nerve of the cat, like that of the dog, (Lemere '32), contains in the main two types of fibers, large heavily myelinated ones and others that are small and thinly myelinated. Within the nerves the two types of myelinated fibers are rather sharply segregated according to size. This suggests that they may be different in function.

Following intracranial section of the vago-accessory roots (3 cats) or section of only the bulbar accessory roots (2 cats) the large myelinated fibers in the recurrent degenerate while the small remain intact. The conclusion is drawn that the large fibers are motor in function with cell bodies in the caudal portion of the medulla and that the small fibers are sensory with cell bodies located peripherally.

After section of the vagus nerve between the nodose and jugular ganglia (2 cats) the large fibers in the recurrent degenerate and there is apparently a slight diminution in the number of small ones. When the nodose ganglion is extirpated (2 cats) the recurrent nerve completely degenerates. These observations would seem to indicate that the cells of origin of the sensory fibers are largely in the nodose ganglion with possibly some in the jugular. Further information relative to the cell bodies of the sensory fibers is being obtained by the chromatolytic method.

* Read by title.

HYDROCHLORIC ACID IN LEUCOCYTOSIS AND PHAGOCYTOSIS.

—Howard Crane and J. L. Brakefield, Howard College.

The controversy among clinicians as to the value of intravenous hydrochloric acid in stimulation of leucocytosis and phagocytosis has aroused so much comment that Fishbein (J.A.M.A. 2-17-34. Vol. 102, p. 534) was moved to present the arguments both pro and con and to point out the lack of experimental evidence in all instances. Accordingly work was begun to investigate certain pertinent factors suggested by Fishbein.

The initial experiments were carried out on dogs and student volunteers were used later. A dilution of 1:250 hydrochloric acid was used. The titer of the solution was .0459 N. A modification of Wright's method was used for determining the opsonic index.

It was readily concluded after a period of four weeks experimentation that leucocytosis was not stimulated in the dog by intravenous injection of hydrochloric acid. In a casual survey of the blood pictures of the experimental animals it was noted that the white cell count varied from 9,000 to 16,000 and during the same periods the erythrocyte count varied from 4,000,000 to 7,000,000 and at the same time the hemoglobin ranged from 60 to 100.

For the experiments on man healthy male students were selected. White cell counts were made before injection of hydrochloric acid and at stated intervals after injection. There was no leucocytosis or increase in phagocytic index that could be attributed to hydrochloric acid.

In controlled experiments on dogs and man, there is no evidence to indicate stimulation leucocytosis or phagocytosis by intravenous injection of hydrochloric acid.

NEASCUS VAN CLEAVEI (Agersborg).

—F. W. Ward, University of Alabama.

Neascus van-cleavei as redescribed by Hughes, 1928, has been found in Alabama. It is found parasitic in members of the Sunfish family encysted in the liver and kidney substance and the visceral pericardium of the heart. Infected fish have been collected from the Warrior River, Big Sandy and Sipsi River. Hughes has found it in Michigan and the indications are that it has a wide range of distribution. Attempts at lifecycle studies have so far failed. Chickens and cats were used for these.

Neascus van-cleavei is a metacercarial stage of a Trematode belonging to the Family Strigeidae. The adult form is not known.

TRAUMATIC NEURASTHENIA.

—Eugene Thames, M. D., Mobile, Ala.

Seemingly expressive, this term does not indicate how trauma causes neurasthenia. The essential nature of the condition is not indicated. In view of the weight of the exciting cause it is thought that an explanation of this type of neurasthenia may be arrived at and that it will further the solution of the enigma of the disease generally. In the more common type of that neurosis, the gradual onset and the fact that so large a percentage of its victims appear to be constitutionally suffering from the "Willies" renders it difficult to escape the idea of *inborn weakness of nerve centers*. An hereditary neurasthenia is discounted; chronic undulant fever being advanced as a cause of a pathologic debility so insidious that it

simulates a *constitutional weakness*. That patients suffering from traumatic neurasthenia are in fact really ill, often having had fever prior to their accidents and after their injuries manifesting well established metabolic disorders, endocrine perversions, and definite disorders of the heart and stomach, in addition to fever in some instances—in fact, on proper analysis, are more sick than injured. Excepting a few cases of acute neurasthenia there are no special varieties of this disease. Cases are cited, showing the element of trauma to be variable and often a minor consideration; *Status Metaboli Perversi Compensatorii* of the writer, which is said to characterize the majority of neurasthenics, is offered as an explanation of the whole problem, showing how a person seemingly in good health is, in fact, living on a very delicate balance which is destroyed by the occurrence of an accident. This results in a stormy period of ill health until a readjustment of metabolism is affected. The profession accepts emotional shock as a sufficient cause of hyperthyroidism, believing it to be operative in this manner. The writer has shown that many cases of neurasthenia are in fact endocrine disturbances.

SOME STUDIES ON PROTOZOA WITH ULTRAVIOLET LIGHT.

—P. H. Yancey, Spring Hill College.

The effects of ultra-violet radiation on paramecium and amoeba were studied by various methods. First a small beam of ultra-violet light from a mercury vapor arc lamp was focussed by means of the condenser of the quartz microscope on the anterior and posterior ends and nucleus respectively of paramecium. No difference in susceptibility to the agent by the various parts, as measured by lethal time, was observed. The amount of damage done and the lethal time seemed to depend rather on the amount of surface of the cell which was exposed to the light.

In the case of amoeba the whole cell was irradiated. After five minutes there was a violent movement of the plasmasol followed by a rounding up of the organism with granules packed in the center and the periphery clear. Further exposure did not change the appearance but the granules were seen afterwards to have changed in color from black to brown.

Exposure of the whole paramecium cell to monochromatic ultra-violet light of 3650 Å produced no immediate visible effects but death ensued within 24 hours. Exposure to bands of 3132, 3022 and 2800 Å caused death within an hour.

Photodynamic sensitization of paramecia with 1/20,000 methyl green and eosin did not change the lethal time of animals exposed to bands of 3650, 3132 and 2800 Å.

PTOMAIN POISONING A MISNOMER.

—Ralph McBurney, M. D., University of Alabama

Attention was called to the numerous newspaper accounts in which outbreaks of acute food poisoning were attributed to the so called 'Ptomain Poisoning'.

That physicians were frequently not without error, in this respect, was emphasized.

Opinions, setting forth the fallaciousness of such term, by Rosenau, Rettger, Simons, Jordan and others were quoted.

The true chemical nature of ptomains, the fact that they are non specific, non poisonous when taken by mouth and that they do not produce nausea,

vomiting, colic and diarrhea, the outstanding manifestations of acute food poisoning, was brought out.

The results of numerous investigators, including the author, in actual outbreaks of acute food poisoning were briefly summarized to show that most of them were due to actual infection of the gastro-intestinal tract with organisms of the salmonella group, staphylococci and infrequently streptococci, or the toxemia caused by ingestion of the preformed toxins *Clostridium botulinum* growing in incompletely sterilized or pickled food.

Other causes of food poisoning such as that due to chemicals and plant foods were mentioned and a differential diagnosis of all forms of acute food poisoning was given.

A final plea was made for a more critical epidemiological clinical and laboratory study in future outbreaks that the true cause may be determined and given to the public instead of the fallacious term "Ptomain Poisoning", which should be relegated to the rubbish heap of antiquated and misleading terms.

*REFLEX THRESHOLDS VERSUS PERIPHERAL NERVE FIBER THRESHOLDS.

—A. Sidney Harris, University of Alabama.

When a bare afferent nerve is excited by induction shocks, the reflex threshold (for a given reflex) is a function of the frequency of the applied stimuli. The optimally effective frequency (frequency of lowest reflex threshold) is different for different reflexes.

This progressive change in reflex threshold is accounted for by the fact that a single impulse arriving in the central nervous system does not evoke a reflex discharge, but central excitatory state must be built up to neuron threshold by summation of afferent impulses. As the frequency of stimulation is increased, each fiber is pouring its quantum of excitation into the center more often, therefore fewer fibers need to be active, and the intensity of stimulation may be reduced until only the larger fibers, and finally the largest fiber only, perhaps, remains active at the optimally effective rate and lowest threshold.

Comparable threshold changes do not occur in peripheral excitation, as of nerve-muscle preparations, because a single impulse is adequate to evoke a response. According to Erlanger and Blair the summation interval of larger peripheral nerve fibers is about 0.2 to 0.5 milliseconds, therefore frequencies as high as 2000 per second would have to be used to lower the threshold. The depression interval following a sub-threshold shock is about 5 ms., therefore, below 200 per second the threshold remains constant with different frequencies, while from 200 up through a considerable range the threshold would be above normal instead of lowered.

INFLUENCE ON SEX OF A TRIPLO-X CONDITION OF GERM CELLS IN A STRAIN OF *SCIARA COPROPHILA*.

—J. Paul Reynolds, Birmingham-Southern College.

(Part of Doctor's dissertation work in the Department of Zoology of the Johns Hopkins University—1934.)

The sex of the progeny in the fungus-gnat, *Sciara coprophila*, is ordinarily dependent upon the zygotic constitution of the mother. The final step in the determination of the sex of the individual fly is the type of elimination of entire chromosomes from the somatic cells in the development of the fertilized egg. (Metz).

*Read by title.

In a digenic strain (one in which progenies consist of both males and females) the determination of sex is influenced by the type of segregation of sex chromosomes in the maturation of the egg. Here three X-chromosomes are found in the germ cells. At maturation oötidis with two X-chromosomes and oötidis with one X-chromosome are formed. After fertilization the former develop into females and the latter into males. The triplo-X condition has been demonstrated cytologically and genetically.

STUDIES OF THE EFFECT OF CAROTENE AND HALIVER OIL ON THE THYROID GLAND.

—Wendelin G. Luckner, University of Alabama.

Albino rats received in addition to a basal ration excessive amounts of carotene, haliver oil, cod liver oil, and KI. Caritol (0.3% carotene in oil) and haliver oil were used as a source of Vitamin A.

The animals were divided into four groups. Group 1 received 0.1 cc. caritol daily. Group 2 received 0.3 cc. of haliver oil daily. Group 3 received 0.3 cc. cod liver oil in daily doses. Group 4 received the same amount of iodine, given in the form of KI, as contained in the cod liver oil. Animals were killed at regular intervals and the thyroid glands prepared for histological study. Control animals were run with all the groups.

The glands of the animals receiving the haliver oil, carotene, and cod liver oil showed somewhat the same picture, namely, an irregular distribution to a near depletion of the colloid. The iodine present in the cod liver oil evidently does not put colloid in the thyroid gland. However, iodine in the approximate amount found in cod liver oil given in the form of KI increased the colloid. Confirmation was made of a previous report that cod liver oil causes a near depletion in the colloid content of the thyroid gland.

EFFECTS OF VARYING TEMPERATURE AND RELATIVE HUMIDITY UPON THE TOXICITY OF RATTLESNAKE VENOM IN LABORATORY ANIMALS.

—Emmett B. Carmichael, University of Alabama.

It was observed that the toxicity of rattlesnake venom for adult rats varied in summer from that in winter when the animals were kept at room temperature in this laboratory. Because of these observations it was decided to see whether the temperature and relative humidity to which the animals were subjected might not be factors influencing the toxicity. Two temperature ranges were selected: (1), 90°-100° F (incubator) and (2), 48°-60° F (electric refrigerator). The relative humidity was about 41 to 53 in the incubator and 64 to 72 in the refrigerator as determined by Lloyd's hygrodisk and an electric fan. The venom was dissolved in isotonic saline and injected subcutaneously.

The toxicity of rattlesnake venom for adult rats and adult guinea pigs is greater when the animals are kept at the higher temperature range. The minimum fatal dose for the rats kept at the lower temperature range was about three times the minimum fatal dose for those kept in the incubator. The body temperature (rectal) of rats, after venom was injected, rose above normal when they were kept at 90°-100° F and fell below normal when they were kept at 48°-60° F.

AN EXPERIMENTAL STUDY OF THE MOTOR AND SENSORY FIBERS OF THE VAGUS NERVE OF THE CAT.

—J. O. Foley and F. S. DuBois, University of Alabama.

In continuing the study of the fiber content of the vagus nerve (Foley, 1934 meeting) the right vago-accessory roots were divided intracranially in one cat and 21 days allowed for degeneration of motor fiber in the peripheral vagus. Numerical analyses of the cells in the nodose ganglion and of osmicated and silvered (Davenport technique) preparations of the right vagus above and below the nodose ganglion, and of the superior laryngeal and pharyngeal nerves were then made. These were compared with counts of the normal left vagus, branches and ganglion of the same animal and with counts of the normal right side of a second cat of comparable size.

The right side from which motor fibers had been eliminated showed above the ganglion approximately 19,000 and 3700 fibers by the silver and osmic methods, respectively. Below the ganglion there were 24,600 (silver) and 8000 (osmic) fibers. 27,600 cells were enumerated in the nodose ganglion. In the normal left vagus of the same cat there were 26,000 (silver) and 8300 (osmic) fibers above the ganglion, 33,000 (silver) and 10,300 (osmic) below and 28,500 cells. The normal right vagus of the second cat totaled 25,600 (silver) and 10,000 (osmic) fibers above the ganglion, 32,400 (silver) and 14,000 (osmic) below and 27,800 cells.

The motor-sensory fiber ratio in the vagus and the possible reasons for more fibers below than above the nodose ganglion were discussed.

DEMONSTRATIONS

1. *Cercaria stephanocauda ocalana*.—SMITH, SEPTIMA, University of Alabama.
2. Laboratory Diagnosis of Intestinal Protozoan and Helminthic Infestations of Man.—ESKRIDGE, MARSHALL, University of Alabama. Introduced by Septima Smith.
3. *Neascus van cleavei* (Agersborg 1929, Hughes 1928).—WARD F. W., University of Alabama. Introduced by Septima Smith.

CHEMISTRY, PHYSICS AND MATHEMATICS

ELECTRO CHEMICAL CORROSION A POSSIBLE CAUSE OF THE PITTING OF WATER WHEELS.

—C. R. Hixon, Alabama Polytechnic Institute.

This paper discussed the generally accepted theories as to the nature of pitting, and doubtful points in the theories were pointed out.

In an experimental way the pitting of water wheels, propellers, pumps, water glands, etc., was studied. In general, it was observed that when dissolved oxygen was not present in the water, pitting was greatly reduced.

The evidence seems to point to an electro-chemical explanation of pitting.

The experimental set up consisted of the construction of a number of small runners somewhat similar to those of commercial water wheels. These were thoroughly insulated and submerged in water.

It was intended to pass a current through these in order to study the effects of same, but it was found that a current was already flowing. This current rapidly increased when the wheel was put in motion. Corrosion of this wheel took place rapidly. When a satisfactory electrical circuit was set up to take care of this current, the corrosion prac-

tically ceased. This corrosion was completely stopped by connecting the rotating part of the wheel to the negative terminal of a storage battery, the positive terminal being connected to a bank of carbons submerged in the water.

Most of the pitted parts of water wheels in this vicinity are of a sponge or honeycomb texture which suggests some action besides the well known hammer action. Examination of some of these water wheels disclosed the fact that a current which could be readily measured was flowing from the wheel to the case of the turbine.

CHEMICAL AND PATHOLOGICAL CHANGES IN DEATH BY DROWNING AND THE EFFECTS OF NARCOSIS ON THESE RESULTS.

—H. W. Nixon, Alabama Polytechnic Institute.

Dogs were used for experimental work. These dogs were subjected to the influence of various hypnotics and then drowned.

The chloride content of the blood in the right and left side of the heart was determined and the lesions compared with those resulting from the drowning of normal subjects. The results directly verified the correctness of Doctor Gettler's work.

A detailed study has been made by the writer as to the effects of narcosis on these results. The utility of such a method in the scientific investigation of crime in Alabama is obvious.

THE USE OF STEEL SCRAP IN PREVENTING EMBRITTLEMENT OF MALLEABLE CAST IRON IN THE HOT-DIP GALVANIZING PROCESS.

—Fred B. Riggan, Stockham Pipe and Fitting Company, Birmingham, Alabama.

All producers of American black heart malleable are familiar with the phenomenon of brittleness which occurs in apparently normal malleable when cooled suddenly from the "blue-brittleness" or equicohesive temperature. The fundamental cause of this behavior is not yet known. As early as 1923 Bean, now with the Whiting Corporation, noticed that deterioration occurred most frequently in those malleable irons containing the greater amount of phosphorous. Later, Marshall found that by pre-queenching annealed malleable cast iron from 1200 degrees Fahrenheit, the metal was immune from any subsequent embrittlement. This treatment, known as the Flecto Process, is used extensively on castings to be hot-dip galvanized.

In the attempt to produce experimentally this phenomenon in malleable cast iron having a wide range of analyses, we noticed that all those samples containing less than 1.00% silicon and .09% phosphorous would not show deterioration.

Although operating in an area where only high phosphorous pig iron is readily available, we are able to keep well within this silicon and phosphorous range in our entire production by the use of an unusually high steel scrap mixture. This operation saves us the expense of purchasing low-phosphorous pig iron, which formerly had to be brought from the North, and also saves time and expense that would be involved in the Flecto Process.

DYES FROM FURFURAL.

—Claude E. Chamblee and B. F. Clark, Birmingham-Southern College.

Fischer's method of preparing Schiff bases from furfural and aromatic amines has been improved, both in regard to yields and the quality of the products formed. Bases have been made by condensing furfural with aniline, ortho and para toluidine, alpha naphthylamine, sulfanilic acid, H acid, and benzidine, the latter a compound never previously prepared. The Schiff bases can be diazotized and coupled with various amines and phenolic substances to form dyes. Several of these dyes have been prepared but they generally precipitate as tars and are therefore troublesome. The only crystalline dye so far obtained is that formed by diazotizing the furfural-aniline base and coupling with two molecules of resorcinol. Further work is to be done on the preparation and purification of the dyes.

PREVENTION OF THE DARKENING OF FURFURAL IN LIGHT.

—B. F. Clark, Birmingham-Southern College.

Because of the difficulty encountered with furfural darkening on exposure to light, it was thought desirable to search for some material which might be a negative catalyst for this change. Some two hundred inorganic compounds have been investigated so far and although the results are encouraging, a satisfactory material has not yet been found. Halides and nitrates appear to catalyze the coloring while adsorbent materials such as infusorial earth retard the action. Work is being continued in this field in the hope that a satisfactory anti-catalyst may be found.

SEMI PLANT AND PLANT SCALE CONSIDERATIONS IN THE MANUFACTURE OF SLAG GLASS.

—C. A. Basore, Alabama Polytechnic Institute.

NOTE: The data on which this paper is based was compiled in large measure by Mr. L. H. Hull.

The production of four kinds of slag glass on a small scale has been previously reported. The green and black glasses, have been made successfully on a semi-plant scale, employing a small pot which was part of the standard equipment of a glass plant. The glass was comparable to that made on a small scale, and could be easily pressed or rolled, but was blown with difficulty.

Plant scale considerations include a discussion of the difficulties that arise in the use of slag in glass manufacture and how they may be overcome, a study of the plant scale equipment with cost of same, a discussion of the important factors in the location of a slag glass plant, and a study of the comparative raw materials costs of slag glasses and various commercial glasses, and the superior qualities of the slag glasses.

The slag glasses are superior to ordinary soda lime glass with respect to toughness, resistance to breakage, tensile strength, and resistance to corrosion. They also show a saving in the cost of the raw materials from 35 to 75%.

THE SYNTHESIS OF 6-HYDROXYQUINOLINE AND SOME OF ITS DERIVATIVES WITH A DISCUSSION OF THEIR POSSIBLE USE AS THERAPEUTIC AGENTS.

—G. W. Hargreaves, Alabama Polytechnic Institute.

The importance of quinoline derivatives in therapeutics was discussed and several examples of quinoline compounds of various therapeutic actions given.

6-hydroxyquinoline is made by a modified Skraup reaction using 44 g of p-amino, 27 g of p-nitro phenol, 100 g of glycerol 60 cc of glacial acetic and 54 cc of sulphuric acid. The mixture is refluxed 24 hrs., diluted with 500 cc of water and purified by fractional precipitation with NaOH. The first dark precipitates are discarded and the lighter colored hydroxyquinoline is obtained upon neutralization. It is re-crystallized from 10% acetone in water using decolorizing carbon. Yield 35 g. MP 193.

Quinoline ortho quinone is obtained by oxidizing the hydroxyquinoline with lead peroxide and 2% sulphuric acid. This compound reacts with ammonia giving a compound which is blue in alkaline and reddish yellow in acid solutions. The quinone reacts with aniline in boiling water to form a compound which separates out in garnet red crystalline scales MP 197. It is being further investigated.

Quinine upon oxidation in a similar manner gives analogous colored solutions with ammonia and aniline.

6-hydroxyquinoline couples with diazotized amines in a manner analogous to beta-naphthol. It has been coupled with the following diazotized amines: o-, m-, and p-amino benzoic acids, p-toluidine, aniline and benzidine.

These substances are to be investigated in regard to their toxicity and antiseptic properties as they are similar in structure to Pyridium, a phenyl azo pyridine derivative which is used as a genito-urinary anti-septic.

A SPECIAL CIRCLE IN THE HYPERBOLIC PLANE.

—Henry Gerhardt, Mobile.

In hyperbolic geometry the area of a triangle cannot exceed $4C_h^2\Pi$

To show that the radius of the inscribed circle for such a maximum triangle $r = C_h \log 3$ was the subject of the present paper.

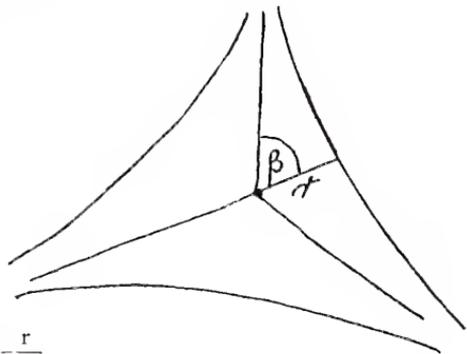
As β is the parallel angle to r we have

$$\cos h \frac{r}{2C_h} = \frac{1}{\sin \beta}$$

$$\text{but } \beta = \frac{\Pi}{3}$$

$$\sin \beta = \frac{2}{\sqrt{3}}$$

$$\cos h \frac{r}{2C_h} = \frac{2}{\sqrt{3}} = \frac{\frac{r}{e^{2C_h}} + \frac{r}{e^{2C_h}}}{2}$$



If we write $\frac{r}{2C_h} = x$

$$\frac{e^x + e^{-x}}{2} = \frac{2}{\sqrt{3}}$$

$$e^{2x} - \frac{4}{\sqrt{3}} e^x + 1 = 0$$

$$e^x = \frac{3}{\sqrt{3}}$$

$$e^{2x} = 3$$

$$x = \frac{\log 3}{2}$$

$$r = C_h \log 3$$

SOME APPLICATIONS OF THE ALLISON MAGNETO-OPTIC METHOD IN PLANT PHYSIOLOGICAL CHEMISTRY.

—A. L. Sommer, Alabama Polytechnic Institute.

The magneto-optic method may be used to detect the presence and estimate the amount of various chemical compounds within small and sufficiently transparent algal cells without injury to the plant. Studies have been made by this method of the effect of phosphorus on the formation of formaldehyde and nitrite and the utilization of nitrate and ammonium ions by mixed algal cultures.

In these experiments the observing tubes containing the algae were placed in the apparatus and readings indicative of the concentration of the compound to be determined were made. In the cases of the formation of formaldehyde and nitrite, the tubes containing the algae were then exposed to light and readings again made. The readings showed increasing concentrations of these substances on successive exposures to light. For the utilization of nitrate and ammonium ions readings were made as soon as these substances were added to the cultures and the tubes then allowed to stand in the dark for certain periods of time and readings again made. The presence of phosphate in the solution increased the rate at which both the formaldehyde and the nitrite were formed but had a much greater effect on the nitrite formation. It also increased the rate of utilization of nitrate and ammonium ions. The concentration of nitrite on exposure to light did not increase as rapidly when conditions for formaldehyde formation were good as they did when the solutions had been aerated to remove most of the carbon dioxide. The formaldehyde concentration did not increase as rapidly when nitrate was present in the solution as when it was absent. This is evidence in support of the theory of Baly, Heilbron, and Hudson that a combination of formaldehyde and nitrite constitute the first step in protein synthesis.

SOME ADDITIONAL ANALYTICAL DATA ON A FEW ALABAMA GROWN VEGETABLES WITH A COMPARATIVE CHECK OF STANDARD CHEMICAL METHODS WITH THE NEW MAGNETO-OPTIC METHOD OF ANALYSIS.

—Herman D. Jones, Alabama Polytechnic Institute.

Some needed additional analytical data on a few Alabama grown vegetables were reported.

A comparative quantitative study has been made with the A.O.A.C. methods and the Allison magneto-optic method of analysis. From the results obtained the following conclusions are made:

1. It is seen that these minerals vary in the plants when obtained from different localities. What effect the fertilizers have in causing this will require further investigation.
2. In those sections where a deficiency is found the farmers should increase the minerals which are desirable for their localities and in this way increase the plant mineral material. This likewise needs to be further investigated as the pH of the soil will play an important role in governing the amount of the mineral which can be absorbed by the plant.
3. The work should be extended over a longer period of time so that a larger number of vegetables could be analyzed. These results should then be very carefully interpreted and studied with the county medical group with the view of making a close study of the inhabitants of each locality for deficiencies in these minerals.
4. That the magneto-optic apparatus can be used to advantage in quantitative determinations of this nature.

CONCENTRATION AND PURIFICATION OF ALABAMA MANGANESE ORES.

—C. A. Basore and E. M. Eiland, Alabama Polytechnic Institute.

Indications are that considerable quantities of manganese ore (chiefly the oxide) are present in the State. The manganese content in the samples examined ranged from 5.43 to 36.38 per cent.

Various methods for the concentration of Alabama manganese ore were discussed. A method developed by the Bureau of Mines and applied to Western ore which consisted of solution of the manganese by sulfur dioxide in water was adapted to Alabama ores. The manganese was recovered as $MnSO_4$ or MnO_2 .

The above method was modified to meet Alabama conditions and the method applied to a number of Alabama ores. A fineness of 200 mesh, an excess of 200 per cent of sulfur dioxide, a temperature of $45^\circ C.$, an SO_2 concentration of 1 per cent, and a time of extraction of five minutes, proved to be most satisfactory for soft ores.

A flow sheet was drawn and the probable large scale process discussed. The cost of production also was determined. Indications are that for Alabama ore containing 25 percent manganese, the cost of production should not exceed \$8.20 per ton of ore treated, while the value of manganese recovered is from \$17.72 to \$26.58.

GEOLOGY, ANTHROPOLOGY AND ARCHEOLOGY

THE ROCK ASPHALT DEPOSITS OF THE HARTSELLE-COLBERT COUNTY AREA.

—S. J. Lloyd, University of Alabama.

Although asphaltic rock is widely distributed in northwest Alabama, it has been developed commercially in Colbert County only. Asphaltic sandstone of Bethel age has been shipped from a quarry near Cherokee, and asphaltic limestone of Gasper age from two quarries, one near Margerum, the other near Cherokee. Although the rock is somewhat low in bituminous content, excellent results have been obtained with it in practice.

BAUXITE, TRIPOLI, AND FULLERS EARTH IN NORTHEASTERN MISSISSIPPI.

—F. E. Vestal, Assistant Geologist, T. V. A.

The bauxite deposits are part of the basal Wilcox. Although the ore is widely scattered over the hilly outcrop area, the chief accumulations are roughly grouped. The total tonnage, which may reach 2,500,000 to 3,000,000, or even more, includes all grades of ore, but by far the larger part of it is low-grade. Most of it is far from a railroad, and much of it far from a good highway. However, in view of its slight overburden, its proximity to the power centers of the Tennessee Valley, new processes for utilization and new uses for low-grade ore, it may prove industrially valuable.

The tripoli is present almost everywhere in the Juka (Tuscumbia) formation (Paleozoic), which is confined to Tishomingo County, but seems to be concentrated near the base of the formation. Of the three notable accumulations, all in the lower Bear Creek area, the largest shows best about a mile southwest of Eastport in an old abandoned mine. All of the Mississippi tripoli is mixed and interbedded with chert, is pure white and very fine grained. All the deposits will be on or near the Pickwick dam pool.

The fullers earth of Prentiss, Itawamba, and Monroe counties is interbedded with sands and clays of the basal Eutaw. It is characterized by a dull white or light greenish-yellow color, soapy feel, conchoidal fracture, and lack of plasticity. None of the deposits is near a railroad, and all have rather heavy overburden in most places. However, near Booneville the material is being mined from open pits on a small scale. The deposits appear to be lenses, some of very considerable extent and several feet thick.

BROWN ORE OF THE MUSCLE SHOALS DISTRICT.

—A. J. Blair, Birmingham, Alabama.

The principal concentration of brown ores in the Muscle Shoals District is the large and very important deposits in the vicinity of Russellville, Franklin County. Another important but little worked deposit is the O'Neal ore bank in Lauderdale County. For a number of years the Russellville deposits have been the largest producing brown ore mine in the world. The brown ore or limonite occurs in residual soils weathered from limestone, of Bangor (Mississippian) age. The ores are mined by steam shovel and are separated from the associated clays by treatment in log washers. As a general rule the ores run about 40 to 50% metallic iron.

There appear to be large reserves of brown ore in the Russellville District, all of it within a reasonable distance from railroad transportation.

CEMENT RESOURCES AND LIME, GYPSUM.

—Edwin C. Eckel, Geologist for T. V. A.

The Muscle Shoals District is abundantly supplied with raw materials suitable for the manufacture of Portland cement. The Mississippian limestones, where they are not too cherty, are quite well adapted to the supply of the calcareous portion of the Portland cement mixture. Residual soils would be suitable and in sufficient abundance to supply the siliceous part of the mixture. Coal for burning the cement clinker would be brought in from the Warrior Coal field, about 40 miles southeast of the district.

There has been some experimentations on the use of local low grade bauxites in the manufacture of high aluminous and quick setting cements. The results of these tests indicate that it would be possible and feasible to manufacture these special cements within the district.

Lime is now being produced at the Chisca plant, a few miles west of Tuscumbia. Since the Tuscumbia Limestone has some beds which run above 96% calcium carbonate, a high grade lime can be manufactured in almost any desired portion of the general district, according to the demands of the market.

Gypsum has been found in small quantity along Estell's Fork, in Jackson County. The occurrence there is within the Bangor limestone. As yet, the occurrence must be regarded as non-commercial, although the finding of gypsum under such circumstances is very interesting and may possibly lead to the discovery of commercial deposits along that horizon sometime in the future. Thin incrustations of gypsum have been noted in the blue shales of Gasper age, overlying the asphaltic oolite in the western portion of Colbert County. Here again the occurrence is interesting, but not in sufficient quantity to be of commercial value.

CLAYS OF THE MUSCLE SHOALS DISTRICT.

—T. N. McVay, University of Alabama.

A brief summary was given concerning the types, geological occurrences and uses of the Clays of this Area. It was pointed out that very little importance could be attached at present to any of the clays in this area. There is very little likelihood of finding residual clays (those formed in place from underlying rocks) because the bed-rock of this area is not especially suited to this type of weathering end-product. The only types of clay possible are the sedimentary types (those transported by water) which may include some of the so-called "fire-clays" or under-clays. These have not been thoroughly investigated but would hardly be expected in the area north of the Coal Measures. This would mean that Morgan, Lawrence, Franklin, and possibly Colbert counties might show some suitable fire-brick clay. A complete report on the clays of Alabama is in the process of preparation.

PLATEAU COAL FIELD OF ALABAMA.

—J. R. CUDWORTH, University, Alabama.

This paper consisted of a description of the coal areas of Alabama with special reference to the relationship between the Warrior and Plateau fields in the region where they are both present. A brief description of the major and minor structural features of the Plateau field was included together with the statistics of the past production and estimated reserves of the field.

The coal seams which have been worked in the past and which are of workable thickness over substantial areas are the Cliff and Dade seams in the northern part of the area and the Underwood and the Blount Mountain section. It was noted that the seam of low volatile coal of workable thickness was exposed on Lookout Mountain in the vicinity of Little River.

SOME RECENT EXCAVATIONS IN THE TENNESSEE VALLEY.

—David L. DeJarnette, Museum of Natural History, University, Alabama.

This program of archaeological investigations, embracing two sections of the Tennessee Valley to be flooded by the backwaters of the Norris and Wheeler dams, was conducted under the supervision of the Tennessee Valley Authority, utilizing CWA and FERA labor, with Major William S. Webb in charge.

Broadly, the program consisted of work in five counties, namely: Lauderdale, Limestone, Madison, Morgan and Lawrence. One shell heap was excavated in Colbert County when CWA labor was temporarily available for that purpose although the site was not within the area to be flooded.

The archaeology of the Tennessee Valley can tentatively be divided into two main cultural divisions, on account of different materials found in the lower and higher levels. First, the "fishing and hunting" people who first occupied this region. Second, a "pottery making" people who practised agriculture. It seems probable that there were two different peoples, having the same physical type; but there may instead have been a gradual cultural change from a primitive state to a more advanced civilization. The "fishing and hunting" people derived a major part of their sustenance from the shoals in the river, the shell fish. These mollusks were dragged from the river, opened on the bank, and the fleshy part eaten, leaving the shells and camp debris on the surface. After each feast, the height of the "shell heap" was gradually increased, until we have the present accumulation.

These high spots along the river bank situated near the shoals were as appealing to the later groups of Indians that roamed this Valley as they are to the "squatters" of today, who quite often set up their camps on these sites. The later groups which I have broadly classed as a "pottery making" people, occupied these sites until they were built up for two or three more feet. This accumulation was made up chiefly of village site debris. These people in settling on the old sites, took advantage of the higher ground and fertility of the soil caused from decayed camp debris for the cultivation of their plants. They possessed the art of making pottery. These people with their more sedentary life and leisure time, soon began to develop religious structures and burial complexes.

The builders of the mounds fall in this latter class of people. Only the small conical mounds were excavated. This type of mound was erected for burial purposes as shown by our excavations.

Of the 275 sites in the Basin to be flooded by the back waters of Wheeler Dam, it was possible to completely excavate only fifteen during the time available. In order to get a more accurate picture of the life of the people who occupied this Valley before historic times, additional investigation will be necessary.

THE USE OF HARTSELLE SANDSTONE FOR BUILDING PURPOSES.

—J. T. DeJarnette, National Park Service, Wilson Dam, Alabama

The sandstone being used for construction purposes in the Nitrate Plant Reservation Park at Muscle Shoals, Alabama, is taken from the Hartselle formation on Tuscumbia Mountain, about six miles south of Tuscumbia.

This work is being done by the National Park Service with ECW funds.

All quarrying is done with Civilian Conservation Corps labor at an average labor cost of \$1.08 per ton. This operation includes stripping, quarrying, and cutting into blocks for transportation to the job. The stone is cut into building size on the job at a cost of 38 cents per cubic foot of cut stone. Approximately 400 tons were quarried in construction of the Nature Study Museum, having a cubic content of 4,380 cubic feet and a flagstone terrace with a floor space of 765 sq. ft.

The color of the stone varies from a light cream to rich reds and browns, and is ideal for rustic buildings. The stone will stand up under fairly high temperatures but it was found advisable to line all fireplaces with fire brick.

This stone is easily worked, especially when freshly quarried. Most of the moisture content evaporates in two or three weeks leaving the stone noticeably harder and of a more subdued color.

This sandstone has been used on scattered projects throughout the Muscle Shoals Area, particularly in veneer work, but our work is the first time that an effort has been made to quarry the stone in large quantities.

The building has caused favorable comment from various groups of people. It is believed that it will cause a growing demand for the Hartselle Sandstone from this area. The stone is quite satisfactory from every standpoint, and should be widely used wherever the Hartselle Sandstone outcrops. This paper was illustrated with slides.

BUILDING STONE OF THE RUSSELLVILLE AREA.

—R. S. Poor, Birmingham-Southern College.

The beds quarried extend from Waco westward to Rockwood, in Franklin County, although the same oolitic formation extends through most of Lawrence County. The rock is in the floor of Moulton Valley which lies 300 to 400 feet below the rim of Sand Mountain.

Moulton Valley is in the very fossiliferous Bangor limestones of Mississippian age. Both of the oolitic limestone members quarried and all of the brown iron ores of this district are found in Moulton Valley. The rocks have a slight southwest dip characteristic of all Paleozoics in Alabama. No other diastrophism of importance is apparent. The general section follows:

- Top Cretaceous blanket of gravel, sand and clays.
- Top Coal Measures sandstones and shales, forming the cap rock for Sand Mountain.
- Bangor Limestone
- 200' Blue fossiliferous limestone, occasional coral reefs, hard to flinty, massive-bedded.
- 0-40' Burgess Oolite, type locality at Burgess quarry, 3 miles east of Russellville. Variable in thickness and physical properties.
- 100' Blue fossiliferous limestone, carrying Blastoids, Crinoid stems, corals Bryozoans, etc. Also carries brown ore mined in Russellville District, disseminated in residual soil.

- 0-55' Rockwood Oolite, type locality near Rockwood where it is 55' thick. Much less variable in its occurrence and having greater extent than the Burgess Oolite. Beds at top and bottom of third member carry an abundance of fossils.
- 100' Blue to gray flinty limestone and dolomites, with several thin layers of shale. Abundantly fossiliferous, rather thin- to thick-bedded, rarely massive-bedded.
- Hartselle Sandstone
- 300' Sandstone, found in Little Mountain.
Golconda, Cypress, Gasper, etc.
- 140' Limestone, cherts, and calcareous shales. Exposed on Tennessee Valley slopes.

The Burgess and Rockwood oolites are quarried.

The *Burgess Oolite* (Upper Oolite) is coarse and granular and has its greatest thickness of 40 feet and type locality at the Burgess quarry, 3 miles due east of Russellville. It is not worked at present.

The *Rockwood Oolite* member is by far the most important worked, since it occurs over such a wide territory. The good stone in this horizon is at least 20 feet thick, from Newburg to Belgreen, a distance of almost 30 miles. Quarries have been worked in this area for more than 50 years. The average thickness is 25-30 feet, but it increases to 55 feet about a mile west of Rockwood. East of Newburg the Rockwood member thins out perceptibly, and becomes dark gray in color.

The Rockwood beds are always near the valley floor and the quarries in it are not more than 50 feet above the bed of Cedar Creek. The stone is very good for building and ornamental purposes. It weathers well and does not stain as badly as similar stone from other localities. This stone in buildings erected in 1885 is still in excellent condition.

METHODS OF MAGNETIC AND SEISMIC PROSPECTING.

—A. J. Westland, Spring Hill College.

Among the many geophysical means of Oil Prospecting, the magnetic and seismic, particularly the reflection-seismic method, seem at present to be preferred and most in use. The present day methods are a noticeable improvement over the earlier magnetic-theodolite and mechanical seismograph employed in the location of structures favorable for the accumulation of oil in commercial quantities. The instruments responsible for the accuracy now obtainable are the improved Magnetic Field Balance and the Electromagnetic seismograph (illustrated in detail by lantern slides made from cuts supplied by the American Askania Corp.)

PHOSPHATES OF THE TENNESSEE VALLEY REGION.

—E. L. Spain, Jr., Associate Geologist, T. V. A.

Tennessee ranks second only to Florida as a phosphate rock producing state, the industry in Tennessee amounting to more than a million dollars a year almost since the time of the discovery of the field in 1893. Almost all the deposits in this important field lie within the Tennessee Valley Region proper.

Phosphate rock is essentially $\text{Ca}_3(\text{PO}_4)_2$ and is made up of Collophane, an amorphous Calcium Phosphate mineral, with small amounts of Dahillite, a crystalline, fibrous Calcium Phosphate mineral belonging to the Hexagonal system.

The brown rock, the most important commercially, occurs in the southern and western portions of the Nashville Basin in Maury, Williamson,

Hickman, Giles, and Franklin Counties. It has been derived from the Bigby, Hermitage, and Liepers formations of Ordovician age, the formational process being one of leaching by groundwater of the Calcium Carbonate contained in the limestones, and leaving the less soluble Calcium Phosphate behind as a residue. The phosphate content in these three limestone formations appears to have been precipitated in some chemical manner from the sea water and laid down with the sediments. This theory is opposed by the former one most generally accepted which postulates shell fish of that time secreting phosphatic shells, the entombment of these shells in the sediments then imparting a certain amount of Calcium Phosphate to the limestone.

The blue rock occurs in the eastern portion of the Western Highland Rim of Tennessee in Maury, Lewis, and Hickman Counties. Unlike the brown rock this type is an unaltered rock, the Hardin member of the Chattanooga formation of Mississippian age.

The white rock deposits are relatively unimportant commercially due to the nonuniformity and heavy overburden. These deposits are secondary ones formed by the leaching of Calcium Phosphate and later precipitating it in a chert breccia and in solution cavities at the top of the Decatur limestone of Silurian age and the bottom of the Linden formation of Devonian age.

REFORESTATION AND SOIL, EROSION CONTROL.

—Carl T. Jones and James D. Hays, U. S. Forest Service.

The Tennessee River, because of the removal of a large portion of the forests, during the process of more than a century of cultivation in the region, is a heavy bearer of sediment. It may be readily seen that a continuation of this condition will ultimately result in the partial filling of reservoirs such as that above Wilson Dam. In order to prevent such an occurrence and to preserve fertility of the soils thus being removed, the U. S. Forest Service, in cooperation with the Tennessee Valley Authority, and the Civilian Conservation Corps, is undertaking to plant trees wherever possible. Furthermore, cultural cutting and improvement is being carried out. It is unlikely that the program can be completed by the cooperating agencies unless land owners become convinced that the plan is feasible and sound, and will undertake to assist in the fulfillment of the program.

The form of soil erosion control is principally that of the construction of terraces and supporting dams. The dams are being built of stone and mortar, at the base of which are aprons which serve to reduce the speed and resultant scouring effect of the water. Because of the cherty members within the limestone belts, a large amount of rough field stone is available for the construction of soil erosion dams. Here again, the problem is a large one, and its ultimate success is dependent upon the extent of cooperation which the farmers may see fit to give.

INDUSTRY AND ECONOMICS

MACHINERY AND THE BIRTH-RATE.

—Roland M. Harper, University, Alabama.

The birth-rate in the United States and other civilized countries decreased more in the 19th century than in any previous century in the world's history, and the decline has continued at about the same rate in the present century; though some "backward" countries still have a birth-rate not far from the possible maximum. Within the United States there are marked variations between states, between city and country, and between different strata of society in the same community.

This is due to several more or less independent factors, one of the chief of which is believed to be the use of machinery and other labor-saving devices. The decline began in England and the older parts of the United States with the invention of the steam-engine, and seems to have been accelerated in the 20th century by the automobile and by improved methods of generating and transmitting electricity.

The explanation of this is that a certain amount of exercise seems to be necessary for health, and whenever and wherever machinery is substituted for muscle, the health of the population, and therefore the birth-rate, tends to decline. Farmers and miners get much more exercise than city people, and have larger families, but their labors too have been lightened considerably by machinery and electricity, and they have fewer children now than formerly. The ancient Romans, and the ante-bellum southern planters, did not have much machinery, or any electricity, but they had slaves to relieve them of exertion, and many of the families died out.

Some striking correlations, both historical and geographical, can be made between the birth-rate or size of families and the value of machinery per farm, the ratio of automobiles to population, the per capita consumption of gasoline and electricity, etc.

This paper was illustrated by seven graphs.

THE COTTON INDUSTRY OF HUNTSVILLE.

—Roy A. Harrison, Florence.

That Huntsville, Alabama, with its satellite mill villages, should have become the largest cotton textile manufacturing center in Alabama is a challenge to the economic and industrial geographer. This fact becomes more interesting when it is noted that Huntsville is not located on a stream or a river.

The fertile, level, accessible area around Huntsville was settled at an early date by people who knew cotton culture. Cotton was one of the few cash crops that could stand the long distance transportation to markets. Negro slaves furnished the labor.

To supply their own requirements the settlers at first spun their own cotton and made their own clothes. The first mills of any sort erected by the settlers were water driven mills. The same water was next supplied to textile machinery, and the first cotton mill of any consequence in Alabama was built on the small, easily-harnessed Flint River about 1828. This mill sufficed during the days of water driven machinery and water and wagon transportation.

At an early date a considerable organization existed for the purchase of raw cotton from the surrounding region.

With raw cotton in the region, with power resources in the form of electrical energy available at small cost, with relatively cheap living costs in part due to climatic condition, with cheap skilled labor, good transportation, excellent water supply, and good markets, it was inevitable that Huntsville would become an important textile center.

AN ECONOMY OF WELFARE.

—Benton MacKaye, Land Planning Division of T. V. A., Knoxville, Tennessee.

An economy of welfare is distinguished from an economy of wealth. The distinction is as vital as it is simple. The first doctrine analyzes the ultimate objective (welfare) into its proximate objectives in terms of the individual, the population, natural resources, industrial organization; it recognizes wealth as an important means to welfare but not as an object in itself. The second doctrine recognizes welfare as a theoretic end but so exalts the role of wealth as to make it in effect an end unto itself.

Planning is the handmaid of the economy of welfare; planlessness is the consort of the economy of wealth. Planning as meant herein is limited to that made from the viewpoint of the map. This may be visualized as the control or guidance of three types of "flowage"—of waters, of commodities, of population. Each type is illustrated in developments now going on, in the Tennessee Valley and elsewhere, via plans designed under public authority. The treatment in such development embodies the economy of welfare or the doctrine of planning; the treatment accorded to corresponding development by agencies not responsible to public authority embodies the economy of wealth or the doctrine of planlessness.

 THE FORESTS OF THE TENNESSEE VALLEY.

—Roland M. Harper, University, Alabama.

The Tennessee Valley in Alabama was originally almost completely covered with forests, but farmers long ago cleared away most of the trees from the better soils, and the best trees have also been taken from the uncultivated lands, especially in the last few years, since good roads and motor trucks have made all trees more accessible than ever before.

The forests of the area may be divided broadly into four groups, based on geology and soil. The chert area or barrens, on the Lauderdale chert, along the north edge of the state from Madison County westward, is still about two-thirds wooded, and the forests are about 30% evergreen. The commonest trees are short-leaf pine, red and white oaks, and sweet gum.

The red clay lands on both sides of the Tennessee River, on the Tusculumbia limestone, are not more than one-third wooded, and much of the forest is second growth. About 10% of the trees are evergreen, and the commonest species seem to be sweet gum, red oak, sycamore, willow oak, and short-leaf pine.

The slopes of Bangor limestone, bordering the sandstone plateau on the south and east, are too steep to have much soil, and are almost completely wooded. The commonest trees are cedar, scaly-bark hickory, several oaks, walnut and ash.

Little Mountain, of Hartselle sandstone, is very similar in soil and topography to the plateau a few miles farther south, but is lower and smaller. It is still mostly wooded, and the forests are about half evergreen. Three pines and several oaks make up the bulk of the forest.

The valley taken as a whole has a great variety of trees, especially hardwoods, and many wood-using industries. Besides lumber of various kinds it produces oak crossties, cooperage, cedar posts and pencil-wood, and many other things. About 1/2 of 1% of all the workers in the valley counties were engaged in forest industries in 1930, but this does not include sawmills, and plants making more finished products of wood.

*LINEAR HIGHWAY ZONING AS A MEANS OF CONTROLLING
HIGHWAY DEVELOPMENT IN THE SOUTH.

—John W. Hyde, Alabama Polytechnic Institute.

Land values created by public highways should be guarded from private exploitation. Unrestricted roadside development (1) Seriously interferes with the value of the highway, (2) Is dangerous, (3) Mars the scenic beauty, (4) Depreciates property values.

Undesirable structures abutting highways may be legally controlled at present by: (1) Special taxes, (2) Prohibition at curves, intersections, etc., (3) Billboard licensing, (4) Acquiring abutting strip by purchase.

The grant of power known as zoning enables states and communities to: (1) Control the density of population, (2) Control the location and use of buildings, (3) Control the uses of land—all for the benefit of the public at large.

The city is usually taken as the political basis for zoning but the regional unit may also be taken as the fundamental geographic, social, economic, and political basis for zoning and planning.

Although the highway is not such a unit, linear or highway zoning contemplates the highway as a superimposed functional unit which, when zoned, would transcend but not conflict with comprehensive zoning schemes. Only two zones may be recognized in agricultural sections of the country: (1) the roadside and (2) the remainder of the country.

Linear zoning is particularly adapted to the south because of (1) the paucity of other zoning and (2) the relatively large amount of rural area traversed by state highways. Linear zoning must be correlated with state and municipal zoning and planning and with the regulatory methods listed above for the: (1) Protection of natural roadside beauty, (2) The elimination of roadside slums and billboards, (3) The preservation of the safety and efficiency of the highway, (4) The stabilization of adjacent land values.

GEOGRAPHIC TECHNIQUES APPLIED TO LAND USE.

—G. Donald Hudson, Division of Land Planning and Housing,
T. V. A., Knoxville, Tennessee.

The geographer's interest in problems of land use grows out of his study of the relationships between human activities and the natural environment. One of the major contributions of geography to these problems consists of the techniques the geographer employs in the presentation of distributions and the gathering of field data. Of these techniques the isopleth map, the fractional system of recording field data, and the traverse method of field mapping are outstanding in their value. The objective common to these techniques is the scientific portrayal of the occupancy pattern,—that is, the landscape expression of the life of an area. Using the occupancy pattern so portrayed as a basis, the relationships between human activities and the natural environment can be isolated and studied. Therein lie other major contributions that geography has to offer the study of problems of land use.

*Read by title.

DEVELOPMENT AND PLANS FOR RURAL ELECTRIFICATION IN THE SOUTH, WITH NORTHWEST ALABAMA AS AN EXAMPLE.

—Llewellyn Evans, Chief Electrical Engineer, T. V. A., Muscle Shoals.

This paper dealt particularly with the efforts of TVA to dispose of the surplus power from their navigation and flood control works in such a way as to bring the greatest good to the greatest number of citizens.

After the period of rural line construction by CWA workers, TVA has been encouraging the building of rural lines by the formation of non-profit mutual associations of users and by the expansion of municipal distribution systems. In either case, in limited proving areas the Authority builds the lines and sells them to the distributing agency on long-term payment scheme. The oldest example of the mutual system is the Alcorn County Electric Power Association in Mississippi. Their successful operation points to the complete retirement of the debt to TVA in less than six years. As it is a private corporation, it pays all taxes, city, county, and state.

In Lauderdale County, Alabama, a rural system started by CWA labor was completed by TVA with the intention of turning the plant over to a mutual association. A canvass of farmers now connected shows a most remarkable response. Those interested in capital goods industries would be surprised to learn that before the second month had passed, these farmers had purchased goods or made improvements to their farms averaging \$225.00 a piece. The farmers are particularly pleased by additions to their income made possible by electric service. As an example: "79c alarm clock turns on the lights in the poultry house at 3:45 A. M. Increase in egg production since starting the use of lights is enough each day to pay my monthly electric bill."

PROGRAM OF THE JUNIOR ACADEMY

Saturday, April 13th, 1935

Auditorium, Wesleyan Hall. Exhibits: Wesleyan Hall

President, Robert Knapp.....Woodlawn High School, Birmingham
Vice-President, Russell Lanier.....Ramsay High School, Birmingham
Secretary, George Rush.....Murphy High School, Mobile
Treasurer, Helen McCown.....Academy of the Visitation, Mobile

- 8:00 Opening remarks by President Robert Knapp.
8:05 Dr. Kelley Elmore, Chemist T.V.A., Sheffield, will address Junior Academy.
8:30 *Business Session*: Election of officers and transaction of business by the authorized delegates from the several chapters.
9:00 *Scientific Session*: Papers limited to 15 minutes, including discussion of the same.
1. SAM ANDREWS, West End High School—The Use of Magic to Stimulate Our Interest in Chemistry.
 2. FRANK V. CIOLINO, Spring Hill High School—The Effect of Pressure and of Solutions upon the Boiling Point of Water as Exemplified at Yellowstone National Park.
 3. EVALYN GAVIN, Academy of the Visitation—The Importance of Chemistry in America.
 4. JOHN HARRIS, Mortimer Jordan High School—Caring for the Surface in the Home by Means of Chemicals.

5. MARY CATHERINE HYDE, Bishop Toolen High School—These Termites!
 6. LEON McVAY, Murphy High School—Tung Oil.
 7. CORLEY ODOM, Shades-Cahaba High School—Taxidermy as a Hobby.
 8. JOHN L. PHILLIPS, Fairfield High School—King Corn and His Family.
 9. BEN C. ROBERSON and HARWELL DAVIS, Ramsay High School—High Tension.
 10. DAVID RAWLS, Montgomery County High School—The Effect of Ductless Glands on Personality.
 11. RALPH STINSON, DeKalb County High School—Television and Ultra Short Waves.
 12. FRANKLIN ROOK, Woodlawn High School—Cosmic Radiation.
- 11:25 Appointment of Committees.
 11:30 Adjournment and Inspection of Exhibits.
 12:00 Barbecue Luncheon for Sponsors, Delegates and Those Appearing on the Program of the Junior Academy. Campus of State Teachers College.
 1:00 Trip to Muscle Shoals.

CHAPTER MEMBERS OF THE JUNIOR ACADEMY

Bishop Toolen High School—(*Mary Catherine Hyde)	Mobile, Ala.
Coffee High School	Florence, Ala.
Convent of Mercy	Mobile, Ala.
DeKalb County High School—(*Ralph Stinson)	Fort Payne, Ala.
Ensley High School	Ensley, Ala.
Fairfield High School—(*John L. Phillips)	Fairfield, Ala.
Hanceville High School	Hanceville, Ala.
Hazlewood High School	Town Creek, Ala.
Hueytown High School	Bessemer, Ala.
Julius Tutwiler Wright Science Club	Mobile, Ala.
Minor High School	Ensley, Ala.
Montgomery County High School—(*David Rawls)	Ramer, Ala.
Mortimer Jordan High School—(*Josephine Greer)	Morris, Ala.
Mount Hope Science Club	Mount Hope, Ala.
Murphy High School—(*Leon McVay)	Mobile, Ala.
Phillips High School	Birmingham, Ala.
Ramsay High School—(*Ben C. Roberson)	Birmingham, Ala.
Selma High School	Selma, Ala.
Shades-Chaba High School—(*Jack Moore)	Birmingham, Ala.
Spring Hill High School—(*Frank Ciolino)	Spring Hill, Ala.
Visitation Academy—(*Evalyn Gavin)	Spring Hill, Ala.
West End High School—(*James Davis)	Birmingham, Ala.
Woodlawn High School—(*Franklin Rook)	Birmingham, Ala.

*Authorized delegates to the third annual meeting of the Junior Academy.

OFFICERS OF THE JUNIOR ACADEMY—1935-1936

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Vice-President, RALPH STINSON.....	DeKalb County High School Fort Payne, Alabama
Secretary, EILEEN LLOYD.....	Mercy Academy Mobile, Alabama
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ROGER W. ALLEN.....	Alabama Polytechnic Institute Auburn, Alabama
GERALD THOMAS.....	Woodlawn High School Birmingham, Alabama

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Blair, C. S. (C).....	Comer Bldg., Birmingham, Ala.
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†Brakefield, J. L. (A).....	Howard College, Birmingham, Ala.
*Brannon, Peter A. (C).....
.....	Archives and History, Montgomery, Ala.
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Carder, Homer (D).....	1225 Elizabeth Ave., Tarrant, Ala.
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Church, Anna E. (B).....	University, Ala.
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Cunningham, F. F. (D).....	St. Teachers College, Florence, Ala.
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Doner, Ralph (G).....	Auburn, Ala.

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†Jones, Herman D. (B).....Auburn, Ala.
†*Jones, W. B. (C).....University, Ala.
†*Jones, W. C. (F).....T. C. I. Hospital, Fairfield, Ala.
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McGlamery, Winnie (C).....University, Ala.

- McVay, Thomas N. (B) University, Ala.
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 Van Aller, T. S. (F) 903 Charleston St., Mobile, Ala.
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 Wooley, Mary (Miss), (B) Murphy High School, Mobile, Ala.
 †Xan, John (B) Howard College, Ala.
 †Yancey, Patrick H. (A) Spring Hill College, Ala.

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Gray, Joe	1140 S. 13th St., Birmingham, Ala.
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Ward, Jane	Sweetwater, Ala.
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White, Urban	St. Bernard College, Cullman, Ala.
Wood, Ralph M.	1219 17th Ave., S., Birmingham, Ala.
Youngblood, R. W.	1530 N. 33rd St., Birmingham, Ala.

*Charter members of the Alabama Academy of Science. The complete list so far as it is known was published in Volume V of the JOURNAL, p. 8.

†Member A. A. A. S.

‡Honorary Member.

The letters (A), (B), (C), (D), (E), (F) and (G) indicate: (A), Biology; (B), Chemistry; (C), Geology, Anthropology and Archeology; (D), Industry and Economics; (E), Mathematics; (F), Medicine; (G) Physics, as the chief field of interest of the member.

THE NEW YORK ACADEMY OF SCIENCES
77th Street & Central Park West
NEW YORK, N. Y.

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of the

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MAY, 1936

VOLUME 8

PROCEEDINGS

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THE THIRTEENTH ANNUAL MEETING

ALABAMA POLYTECHNIC INSTITUTE
MARCH 20 AND 21, 1936

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1935-1936

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Spring Hill College, Ala.
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A. G. OVERTON.....	Ala. By-Products Corp.....	1935-1936

GENERAL PROGRAM
Thirteenth Annual Meeting
Auburn Polytechnic Institute
March 20 and 21, 1936

Friday, March 20

- 8:30 A.M. *Registration* by all members and guests at entrance of Ross Hall. Secure tickets for banquet (Friday, 7 P. M.) and register for Saturday field trips.
- 10:30 A.M. *Executive Committee Meeting*, Room 211, Ramsay Hall.
- 11:15 A.M. *Preliminary Business Meeting*, Room 204, Auditorium, Ross Hall. Appointment of committees, etc. Adjournment until 5 P. M.
- 11:50 A.M. *Photograph* of the Academy in front of Ross Hall.
- 12-1:00 P.M. *Luncheon* (private, in various hotels and restaurants of Auburn).
- 1:30 P.M. *Section Meetings*. Papers, discussions demonstrations, election of section chairmen and secretaries for 1936-1937.
Demonstrations will be held in Room 202, Ross Hall. There will be a tea in this room, 3-5 P. M.
- Section I.* Biology and Medical Science, Room 216, Ross Hall. C. M. Farmer, chairman; Margaret Hess, secretary.
- Section II.* Chemistry, Physics and Mathematics, Room 204, Auditorium, Ross Hall. B. F. Clark, chairman; John Xan, secretary.
- Section III.* Geology, Anthropology and Archeology, Room 318, Ross Hall. T. G. Andrews, chairman; David T. DeJarnette, secretary.
- Section IV.* Industry and Economics, Room 203, Ross Hall. W. M. Mobley, chairman; Troy Sizemore, secretary.
- 1:30 P.M. *Alabama Junior Academy of Science*. See General Program on page three.
- 5:00 P.M. *Final Business Meeting*, Room 204, Auditorium, Ross Hall. Reports of committees, election of officers, appointment of standing committees, other business, adjournment.
- 7:00 P.M. *Annual Banquet* (informal), Dining Room, Thomas Hotel, J. L. Brakefield, Toastmaster. Reservations should be made by mail with C. A. Basore, Alabama Polytechnic Institute, Auburn. (\$1.00 per plate.)

7:45 P.M. *Annual Public Addresses*, Dining Room, Thomas Hotel.

Addresses of Welcome: Dr. Luther Duncan, President, Alabama Polytechnic Institute.

Response: R. S. Poor, Birmingham-Southern College.

Presidential Address: "Research, Its Value and Influence on Recovery," A. G. Overton, Alabama By-Products Corporation, Tarrant, President of the Academy.

9:00 P.M. *Public Reception* in President Duncan's Mansion.

Saturday, March 21

9-11:00 A.M. *Geological and Archeological Field Trip* visiting the important geological formations and archeological sites in the vicinity of the new Chewacla State Park. This trip will be conducted by Dr. Walter B. Jones, State Geologist, and will require about two hours. Open to all.

9:00 A.M. *Section Meetings*. Those sections which did not complete their programs on Friday may do so at this time in the same rooms. There will be no meeting of Section III on Saturday.

12-1:00 P.M. *Luncheon*.

1:00 P.M. *Trip to Tuskegee Institute*.

MINUTES OF THE MEETING OF THE EXECUTIVE COMMITTEE, MARCH 20, 1936

The meeting was called to order at 10:30 a.m. at Ramsay Hall by A. G. Overton, President of the Academy, who handed to the secretary an outline of business for the meeting.

1. **The minutes.** The minutes of the previous meeting of the Executive Committee, held at Florence, April 12, 1935, were read by the secretary. They were approved as read.

2. **The Journal.** President Overton announced the holding over of the preliminary publication of the Journal until another year, but wished to continue on record as concurring in the policy, passed at the last meeting, that the Journal be published before the next meeting. Non-Publication at this time was based upon inadequacy of funds and insufficiency of number of abstracts received, a total of forty-four being available, with no extra funds for expenses of the meeting. It was estimated by the acting-editor that over 300 Journals would need be published. This number is based upon an exchange list of fifteen or twenty, plus a paid membership estimated by the Treasurer as 160, in addition to copies sent to libraries. The president felt that members should not be held responsible for underwriting the Journal, as some had offered to do this year.

3. **Eligibility for presentation of papers.** Dr. Poor brought up this question which was discussed at length. Opinions differed. Some of the executive committee favored the extension of the privilege of presenting papers before the Academy to non-members (Farmer, Yancey, Mobley) for which precedent was quoted from other organizations (Yancey), or to prospective members (Overton). Others preferred limitation of presentation to members (Jones, Clark) except for especially invited papers which may be of value to and reflect credit upon the Academy (Overton, Smith). A motion by Dr. Poor was passed which authorized a letter clarifying the matter to be composed jointly by the president and secretary and sent to section chairmen for distribution to those called upon for papers before the next meeting. The president suggested that the secretary send a list of section members to each section chairman in advance of the next call for papers.

4. **New members.** About thirty new members were added to the Academy this year.

5. **Instruction to the Division Chairmen and Secretaries.** An itemized list of announcements and instructions was prepared by the president for distribution to these officers. This proved a valuable guide for section meetings.

6. **Adjournment.** As many of the items of procedure had been settled by, at the previous meeting or were to be brought before the general session, the executive session closed without further business.

**MINUTES OF THE THIRTEENTH ANNUAL MEETING
OF THE ALABAMA ACADEMY OF SCIENCE
AT ALABAMA POLYTECHNIC INSTITUTE
MARCH 20 AND 21, 1936**

Minutes of the Preliminary Business Meeting

The meeting was called to order by Mr. A. G. Overton, president of the Academy at 11:15 A.M., March 20, at Ross Hall. The minutes of the previous preliminary business meeting were read and approved. The Treasurer's report was accepted and referred to the auditing committee.

Announcement regarding the Academy grant from the A. A. A. S. was made. This was for \$25.00 and was given to Dr. Septima Smith of the Zoology Department, University of Alabama, by the Executive Council which met in the fall of 1935. In addition to this research grant, the Academy is still in receipt of the \$16.00 which it had formerly received from the A. A. A. S., and which was continued this year as a personal contribution by the President, due to his interest in

encouraging research work. Dr. Clark offered a vote of thanks for this act of generosity which was unanimously carried. Thus the Academy received a total of \$41.00 this year.

The President reported that finances did not justify the pre-publication of the Journal this year, but announced that the Executive Committee had gone on record as favoring the advance publication next year. It was moved by P. H. Yancey and seconded by C. A. Basore that this report be accepted. Motion carried. Dr. Poor, acting editor in the absence of the Editor, E. V. Jones on sabbatical leave, recommended that all abstracts be furnished on time at the first call next year, such promptness to be insisted upon by the Vice-Presidents, the Section Chairmen.

Report of the Standing Committees:

1. **The Committee on the Revision of the Constitution.**

P. H. Yancey, Chairman; J. L. Brakefield, E. B. Carmichael, R. S. Poor (substitute for E. V. Jones) and A. G. Overton. The Chairman announced that copies of the constitution with suggested revisions had been sent to all the Academy members preceding the meeting. He moved that the constitution with revisions be adopted. At the suggestion of Mr. E. G. Tellier, such action was deferred until the second business session, so as to allow further thought upon the changes suggested.

2. **Committee on Incorporation.** A. G. Overton, Chairman and Committee. The committee recommended that it was inadvisable to incorporate at this time, but suggested delay until the Academy possesses some property and more research of value can be done. It was moved by J. H. Coulliette and seconded by C. A. Basore that this report be adopted. Carried.

It was suggested by Mr. E. G. Tellier that some arrangement be made to receive delegates upon their arrival at Academy meetings. Dr. Poor suggested the value of advance notice for such action. P. H. Yancey pointed out that pre-publication and pre-distribution of the Journal, or, in lieu of it, mimeographed announcements, would care for details of time of meeting. These, J. F. Duggar intimated, were not made clear before this meeting. For this the President presented his apologies, which were graciously accepted.

3. **Report of the Councilor of the A.A.A.S.,** P. H. Yancey. Report made. Acceptance moved by R. S. Poor, seconded by W. B. Jones. Carried (report appended).

The following committees were appointed and instructed to report at the final business session at 5:00 P.M.

1. **Auditing Committee:** (a) for the Senior Academy: W. M. Mobley, chairman; John Xan. (b) for the Junior Academy: Gerald Thomas, Chairman; B. F. Clark.

2. **Resolutions Committee:** J. L. Brakefield, Chairman; P. H. Yancey.

3. **Committee on Place of 1937 Meeting:** J. H. Coulliette, Chairman; C. A. Basore, T. G. Andrews and H. A. Flowers.

4. **Nominating Committee:** R. S. Poor, Chairman; W. B. Jones, C. M. Farmer.

Two councilors from the Senior Academy appointed by the President to control the affairs of the Junior Academy during the past year were: Gerald A. Thomas, and Roger W. Allen.

Several announcements were made: (a) by Kelley Fitzpatrick of an exhibit of water colors in Room 101, Architectural Building, put on for the benefit of the Academy; (b) the banquet at Thomas Hotel; (c) the trip to Chewacla State Park, auspices Walter B. Jones, and (d) the trip to the Tuskegee Institute. Following these, the meeting adjourned until 5 P.M.

Minutes of the Final Business Meeting

The second business session was called to order at 5:17 P.M. by President Overton. The minutes of the previous final business session were read by the secretary. Their approval was moved by T. G. Andrews and seconded by W. B. Jones. Motion carried.

The Committee on the Revision of the Constitution, P. H. Yancey, Chairman, again reported certain suggested changes. The chairman read a letter from Floyd Cunningham regarding the addition of Geography to Section IV. Such addition was moved by R. S. Poor and accepted by the chairman. The constitution as amended was adopted by a *vive voce* vote (appended).

Report of the Auditing Committee for the Senior Academy: The committee examined and approved report of the Treasurer, B. F. Clark and congratulated him upon his fine report. P. H. Yancey moved and E. G. Tellier seconded the adoption of the report. Carried.

Report of the Auditing Committee for the Junior Academy: The President announced that this report would be given by mail.

Report of the Resolutions Committee: Dr. Brakefield read the resolutions and moved their adoption. Carried (appended).

Report of the Committee on Place of Meeting: Prof. Coulliette announced the invitation received by the Secretary from Dr. George H. Denny, President of the University of Alabama, reinforced by one from Dr. Walter B. Jones, Presi-

dent-Elect, inviting the Academy to meet at the University in the spring of 1937. It was moved that this invitation be accepted. Carried. The date of the next meeting was left to the University authorities and to the Executive Committee.

Report of nominations for chairmen of sections:

Section I. Biology and Medical Sciences:

Dr. C. M. Farmer, State Teachers' College, Troy, re-elected.

Section II. Chemistry, Physics and Mathematics:

Dr. Herman D. Jones, Alabama Polytechnic Institute, Auburn.

Section III. Geology, Anthropology and Archeology:

Dr. J. R. Cudworth, University of Alabama.

Section IV. Industry, Economics and Geography:

Fred B. Riggan, Stockham Pipe and Fitting Company, Birmingham.

Report of the Committee for Nomination of Officers for 1937:

President-elect: Dr. Roger W. Allen, Alabama Polytechnic Institute, Auburn.

Re-elections: Secretary: Dr. Septima Smith, University of Alabama (for one year).

Treasurer: Dr. B. F. Clark, Birmingham-Southern College (for two years).

Editor of the Journal: Dr. E. V. Jones, Birmingham-Southern College (for three years).

Councilor of the A. A. A. S.: P. H. Yancey, Spring Hill College, Mobile.

Dr. S. J. Lloyd moved the acceptance of this report. Dr. B. F. Clark moved an amendment that, following the present tenure each of the three officers, Secretary, Treasurer and Editor be elected for three years. According to this plan no two officers will go out the same year. This will allow for greater efficiency and smoother running of the Academy. To facilitate such a motion, P. H. Yancey suggested the temporary suspension of the constitution. Carried. Original motion with amendment carried.

Dr. J. L. Brakefield, representative of the Academy to the meeting of the Southeastern section of the A. A. A. S., 1935, reported that a second meeting will be held in Athens, Georgia, April 3 and 4 to which Dr. W. H. Boyd has invited a representative from the Alabama Academy. He moved that his report be adopted, his committee discharged, and a new committee be appointed. Motion carried. He was again appointed representative from the Academy. Due to his inability to go at this time, the President, at his suggestion author-

ized the substitution of the Secretary, who attended as a delegate. (Report appended).

Following certain announcements by the President and other members, P. H. Yancey moved a vote of thanks to the President for his long, continued service to the Academy, and that the Secretary be instructed to cast the vote of thanks for Mr. Overton. Unanimously carried. For this the President thanked the members and expressed his appreciation for the work of the officers, the Councilor, and the Councilors of the Junior Academy, especially to Roger Allen of Auburn and to Gerald A. Thomas of Woodlawn, Birmingham. It was reported that Dr. Harris, assistant superintendent of the Jefferson County Board of Education, expressed his appreciation of the work the Senior Academy is doing for the Junior Academy.

The meeting adjourned at 5:45 P.M. with the distribution of the shingles to the new members. The President moved a vote of appreciation to George James Lemmon, University of Alabama, for his artistic lettering of the same. Motion carried.

REPORT OF TREASURER

For the Year Ending March 19, 1936

Receipts

Balance on hand April 11, 1935.....		\$ 51.84
Membership fees received during year.....	\$ 244.00	
Check from A. G. Overton.....	16.00	
Dr. Septima Smith—1935 account.....	10.94	
Reprints of abstracts.....	21.45	292.39
		<hr/>
		\$344.23

Disbursements

F. F. Cunningham (51) expenses of Florence meeting	4.75
Geol. Survey of Ala. (52) programs Sec. III.....	1.48
Heiter-Starke Printing Co. (53) envelopes.....	4.00
J. E. Duval Printing Co. (54) programs.....	26.65
P. H. Yancey (55) lettering on shingles.....	4.50
B. F. Clark (56) stamps.....	6.00
E. V. Jones (57) journal expenses.....	9.82
Birmingham Printing Co. (58) stationery.....	18.00
Birmingham Printing Co. (59) 300 copies journal	109.50

Birmingham Printing Co. (60) abstracts and cuts	22.23	
A. G. Overton (61) stamps	3.00	
B. F. Clark (62) stamps	3.00	
B. F. Clark (63) stamps	1.00	
Zac Smith Stationery Co. (64) ledger sheets	1.15	
W. M. Mobley (65) stamps	2.01	
P. H. Yancey (66) mimeographing of revised constitution	5.04	
Zac Smith Stationery Co. (67) ledger sheets —Jr. Academy	2.20	224.33
Balance, March 19, 1936, Tarrant Branch—1st Nat. Bank		\$ 119.90
		<u>\$ 344.23</u>

B. F. CLARK, Treasurer.

Audited and found correct,
Auditing Committee:
JOHN XAN,
W. M. MOBLEY, Chairman.

REPORT OF THE COUNCILOR OF THE A. A. A. S.

The winter meeting of the A. A. A. S. was held in St. Louis from December 30, 1935 to January 4, 1936. The first meeting of the Council was on Monday afternoon, December 30, and subsequent meetings were held every morning at 9 o'clock.

The following business was transacted in the Council. Reports from the Secretary and Treasurer were received and approved. The latter showed a net loss in membership of 616. Resolutions were adopted as follows: (1) approving the 12-month equal-quarters plan for simplification of the calendar; (2) urging the continuance of Biological Abstracts; (3) prohibiting the unauthorized use of the name of the Association; (4) endorsing the report of the Committee on the Relation of the Patent System to the Stimulation of New Industries; (5) approving the formation of bodies for the preservation of diverse types of American vegetation; (6) endorsing a resolution of the Sixth International Botanical Conference on the control of plant diseases and insect pests; (7) endorsing the efforts of Federal and State agencies to prevent introduction of plant diseases and injurious insects of foreign origin, especially the Dutch Elm disease.

Professor Thomas Hunt Morgan of the California Institute of Technology was elected President of the Association.

The Academy Conference met at 4 P.M., Monday, under the presidency of W. C. O'Kane of the New Hampshire Academy. Its program contained the following items: (1) "A Brief History of the Accomplishments of the Academy Conference" by H. E. Enders of the Indiana Academy; (2) "Ways in which the Science News Letter May Help Junior Academy Members" by Watson Davis of Science Service; (3) Report of the Committee on Coordination of Science Clubs and upon Source Material for Junior Academies; (4) The General Secretary's Report upon State Academy Research Grants; (5) "Work Planned by the Academies" by S. W. Bilsing of the Texas Academy and Secretary of the Conference.

Following the Academy Conference there was a dinner for the officers of the Association and members of the Academy Conference and the Council. Those who had been present at previous dinners said it was the most representative that had so far been held.

Your representative also attended an unofficial meeting of representatives of several southern academies to discuss the formation of a Southeastern Division of the A. A. A. S. He reported that the Alabama Academy favored such an organization but that he knew that the Executive Committee of the A. A. A. S. took the attitude that approval of the formation of a "Division" should come only after an organization representing the territory involved was formed and active. Consequently he suggested that one of the southern academies offer itself as the nucleus for such an organization by inviting the members of other academies to attend its meeting. If a sufficient number accepted a conference could be held to discuss formal organization. Furthermore, since Dr. Boyd of the Georgia Academy had been elected Chairman of a committee to promote the formation of a Southeastern Division, he suggested that Dr. Boyd get the Georgia Academy to issue such an invitation. This suggestion was approved by those present and Dr. Boyd said he would communicate with the heads of the various southern academies.

Several of the reports mentioned above are in printed or mimeographed form and may be had for consultation if desired.

P. H. YANCEY, Councilor.

REPORT OF THE REPRESENTATIVE AT THE SECOND ATLANTA MEETING OF PROPOSED SOUTHEASTERN DIVISION OF THE A. A. A. S.

The following is a formal report of the meeting of the proposed Southeastern Division of the A. A. A. S. held in Athens, Georgia, in connection with the meeting of the Georgia Academy of Science, on April 3 and 4, 1936. For this meeting I was a substitute delegate upon the recommendation of the delegate, Dr. J. L. Brakefield, appointed by the President of the Academy, who found at the last minute, that he would be unable to attend.

On Friday afternoon a preliminary meeting was held by the Executive Council of the G. A. S. with Dr. Henry B. Ward, Permanent Secretary of the A. A. A. S., who spent two days with the group outlining the possibilities of this proposed division. The delegates attended two meetings on Saturday: the first, held in Memorial Hall, at 9:30 A.M., was in conjunction with the G. A. S. at their regular business meeting; the second, a special meeting of delegates, was held in the Psychology Laboratory at 12 noon. Both meetings were presided over by Dr. A. S. Edwards, President of the G. A. S., with Dr. George H. Boyd serving as Secretary. Both are faculty members of the University of Georgia. Dr. C. R. Fountain, President of the Tennessee Academy of Science and the writer were the only out-of-state delegates present. Dr. L. L. Hendren represented the Southeastern Society of Physicists in an unofficial capacity. About nine delegates from various colleges in Georgia attended.

After much discussion, Dr. Sam Guy of Emory University, moved that the President and the Secretary of the G. A. S. contact academies of this district and also certain other organizations, such as the Southeastern Society of Physicists, of Mathematics and of Psychologists, and ask all to meet in Atlanta in the spring of 1937 for a get-together of the scientific men of the South. Motion carried. This organization is to be sponsored by the state academies but is not to be considered a substitute for the same.

No particular limit is to be put on states invited, although the ones considered are: Georgia, Alabama, North and South Carolina, Mississippi, Florida, Tennessee and Virginia (if she so desires). The main aim back of the proposed organization is a frank discussion of the scientific resources of the south by the scientists of the south. Dr. Ward suggested fewer papers and a greater effort on the solution of particular problems.

The majority opinion of the group was favorable to the formation of this division, though the members of possible

affiliated groups could not speak authoritatively for their organizations. The meeting adjourned about 2 P.M. with Dr. Ward remaining over for further conference with the president and the secretary of the G. A. S.

(Signed) SEPTIMA SMITH,
Substitute Delegate for J. L. Brakefield.

REPORT OF THE RESOLUTIONS COMMITTEE

Whereas the Alabama Academy of Science has just held its thirteenth annual meeting at the Alabama Polytechnic Institute

And whereas it was the unanimous opinion of the members of the Academy who were its guests that the success of the meeting was due to the carefully laid and well executed plans of the Administration and Faculty of the Alabama Polytechnic Institute

It was resolved by a motion duly made, seconded and passed at the closing session of the Thirteenth Annual Meeting that a Resolutions Committee express to the Alabama Polytechnic Institute appreciation for the generous hospitality extended to the Academy as a whole, and for the numerous courtesies shown to individual members.

It was resolved further that a copy of these resolutions be forwarded to President Luther N. Duncan, and that a second copy be spread upon the minutes of the Academy.

Respectfully submitted,

J. L. BRAKEFIELD, Chairman
P. H. YANCEY.

REPORT OF THE ACTING-EDITOR OF THE JOURNAL

The regularly elected Editor of the Academy Journal, Dr. E. V. Jones of Birmingham-Southern College was granted his sabbatical leave from the college this year for travel and study and teaching in Soochow University China. R. S. Poor was asked by the Editor to serve as Acting-Editor during his absence.

The Executive Committee in session at the Florence meeting in April, 1935 voted to adopt Editor Jones' suggestion "that the next volume (of the Journal) be published soon after the present (Florence) meeting and another volume carrying the program and, if possible, the abstracts just before the next (Auburn) annual meeting." The Acting-Editor, following this Executive ruling, called for abstracts from the Vice-Presidents in charge of the four sections. The re-

sponse was gratifying considering the difficulty of getting abstracts submitted for the first time prior to the meeting. President Overton decided, however, that the funds in the treasury were insufficient to publish a pre-meeting issue of the Journal and therefore the publication was not issued.

By Academy vote in April of 1935 the Editor was ordered to handle all Academy printing. Acting under the ruling the 400 programs for the Auburn meeting were printed by the Birmingham Printing Company at a cost of \$29.00.

Father Yancey, at the Acting-Editor's suggestion, kindly assumed the responsibility for mimeographing copies of the proposed revision of the Academy constitution.

A total of \$2.61 was spent for postage and telegrams.

The Acting Editor has tried to continue the exchange relations with other academies as established by the Editor, but he has been unable to enlarge upon his previously obtained list of exchanges.

A post-meeting issue of the Journal will be published as soon as feasible after the Auburn meeting. With few exceptions all abstracts are now in hand. A 100% list is anticipated.

Respectfully submitted,

RUSSELL S. POOR.
Acting-Editor.

CONSTITUTION OF THE ALABAMA ACADEMY OF SCIENCE*

Article I.—Name.

This organization shall be known as the Alabama Academy of Science.

Article II.—Purpose.

The purpose of this organization shall be the study and advancement of science.

Article III.—Membership

Section 1. The membership of the Academy shall consist of the following classes:

(1) Honorary Members. Members of the Academy who have had some national honor conferred upon them shall be eligible for Honorary Membership.

(2) Life Members. Any Honorary Member, Fellow or Member of the Academy may become a Life Member by paying into the Treasury the sum of fifty dollars.

(3) Fellows. Members of the Academy who are Fellows of the American Association for the Advancement of Science shall be classed as Fellows of the Academy.

(4) Members. Membership in the Academy shall be open to any man or woman in the State of Alabama who is actively engaged in science, either pure or applied, and who has received a four year collegiate degree, or who has had a minimum of ten years professional experience. Two years may be deducted from this minimum of ten years for each year the individual spent in college.

(5) Associate Members. Any adult interested in the promotion of science in Alabama and who does not qualify for the grade of Member shall be eligible for Associate Membership.

(6) Junior Members. High School seniors, whose chapters are in full and regular standing with the Alabama Junior Academy of Science, upon graduating from high school are granted the special grade of membership to be known as Junior Member.

Section 2. Associate and Junior Members shall not hold office or vote but may present papers before the Academy without introduction. They shall receive all the literature issued by the Academy.

Section 3. The Secretary and Vice-Presidents of the Academy and any other members whom the President may appoint shall constitute a standing Committee on Membership. The Secretary shall be the chairman of this committee. It shall be the duty of this committee to endeavor to increase the membership of the Academy by bringing it to the attention of the people in their locality and by examining the qualifications of candidates and recommending them for the different grades of membership to the Secretary.

Section 4. Members in arrears with their dues for two consecutive years shall be dropped from the roll.

Article IV.—Officers.

Section 1. The officers of the Academy shall be a President, a President-elect, Vice-Presidents who shall act as chairmen of the

*Adopted at the Thirteenth Annual Meeting.

various sections, a Secretary, a Treasurer, a Councilor of the American Association for the Advancement of Science, and an Editor of the Journal.

Section 2. These officers, together with the past Presidents, shall constitute the Executive Committee.

Section 3. These officers shall be elected by a plurality of votes of the members present at the annual meeting of the Academy and their official terms shall commence with the close of the meeting.

Section 4. The tenure of office shall be for one year or until successors shall be elected, except that the Secretary, the Treasurer and the Editor of the Journal shall be elected triennially and shall serve for three years.

Section 5. No one shall be eligible for office who is in arrears in the payment of dues.

Section 6. Vacancies in the board of officers, occurring in the interval between annual meetings, shall be filled in the following manner:

(1) The President-elect shall take the place of the President.

(2) In case the office of President-elect should also become vacant, the office of President shall be filled by (a) the Vice-Presidents in the order of their sections; (b) the Secretary; (c) the Treasurer; (d) the Councilor of the A. A. A. S.; (e) the Editor of the Journal.

(3) The offices of Vice-President, Secretary, Treasurer, Councilor of the A. A. A. S., and Editor of the Journal may be filled by the Executive Committee.

Section 7. At the first business session of the annual meeting the President shall name a Nominating Committee consisting of three active members. It shall be the duty of this committee to nominate officers of the Academy, except the Vice-Presidents who shall be nominated by their respective sections. However, additional nominations to any office may be made from the floor at the election.

Article V.—Annual Meeting.

The date of the annual meeting shall be determined by the Executive Committee. The place shall be determined by the Academy in session on recommendation of a Committee on Place of Meeting.

Article VI.—Disbursements.

All disbursements made by the Treasurer shall be approved by the President.

Article VII.—Sections.

Section 1. The Academy shall have the following scientific sections: (1) Biology and Medical Science; (2) Chemistry, Physics and Mathematics; (3) Geology, Anthropology and Archeology; (4) Industry, Economics, and Geography.

Section 2. Each section shall elect a chairman and a secretary. As stated in Art. IV, Sect. 7, this election is equivalent to nomination for the Vice-Presidency of the Academy as a whole. The newly elected chairman shall appoint a section secretary.

Article VIII.—The Journal

The Journal of the Academy shall be published annually. It shall contain an account of the business transacted at the annual meeting, abstracts of the papers read and such other materials as the Editor may think proper.

Article IX.—The Junior Academy of Science

Section 1. The Academy shall sponsor the Alabama Junior Academy of Science composed of high school science clubs.

Section 2. The President of the Academy shall appoint two members to serve as Counselors of the Junior Academy as specified in the constitution of that body. One of these shall reside at the place of the next meeting and the other at the place of residence of the President of the Junior Academy.

Section 3. The program of the Junior Academy, its chapter members and officers shall be given space in the Journal.

Section 4. Each chapter shall pay to the Academy one dollar per year.

Article X.—Grants-in-Aid for Research

The President shall appoint a committee of five members for handling grants-in-aid for research purposes. This committee shall not only have power to select the candidates for these grants-in-aid but shall also determine the amount to be granted in each case.

Article XI.—Amendments to the Constitution.

This constitution may be amended at any annual meeting by a three-fourths majority vote of the attending members.

BY-LAWS

Article I.—Dues.

The dues for the several grades of membership shall be as follows:

- (1) Life Members: fifty dollars.
- (2) Honorary Members, Fellows and Members: two dollars per year. However, Members who are pursuing graduate work, or who are fellowship students or student assistants shall pay only one dollar per year.
- (3) Associate and Junior Members: one dollar per year.

Article II.—President.

Section 1. The President shall preside at the sessions of the Academy as a whole and of the Executive Committee.

Section 2. He shall appoint all committees.

Section 3. He shall deliver the Presidential Address at the annual banquet at the end of his tenure of office. The text of this address shall be published in the Journal either in full or in abstract or by title as he desires.

Article III.—President-elect.

The President-elect shall perform the duties of the President in the latter's absence.

Article IV.—Vice-Presidents.

Section 1. The Vice-Presidents shall preside at the sessions of their respective sections and, in the absence of the President and President-elect, at the sessions mentioned in Art. II, Sect. 1, according to their rank.

Section 2. They shall be responsible for the programs of their respective sections.

Article V.—Secretary.

Section 1. The Secretary shall keep the minutes of the meetings of the Executive Committee and of the Academy as a whole.

Section 2. He shall be responsible for the arrangement of the annual meeting, including the drawing up of the General Program and the arranging of the sectional programs sent him by the section chairmen.

Section 3. Immediately after the place of the next meeting has been announced he shall appoint, on the recommendation of the inviting institution, the chairman of a local committee to handle the meeting. This chairman may choose the other members of the committee.

Section 4. As chairman of the Membership Committee he shall strive to promote increase in the membership of the Academy and shall notify applicants for membership of their election or non-election to and grade of membership as soon as the Membership Committee has passed upon them.

Section 5. At the annual meeting he shall present new members with shingles signed by the President and himself and sealed with the seal of the Academy.

Article VI.—Treasurer.

Section 1. The Treasurer shall be in charge of the funds of the Academy which he shall keep in a separate bank account.

Section 2. He shall make only such disbursements as are approved by the President.

Article VII.—Auditing Committee.

The President shall annually appoint two auditing committees of two members each, one for the Academy and one for the Junior Academy. These committees shall audit and report upon the financial record of the Treasurers of the Academy and Junior Academy respectively at the meeting for which they were appointed.

Article VIII.—Councilor of the A. A. A. S.

Section 1. The Councilor of the A. A. A. S. shall represent the Academy in the Council of the A. A. A. S., and the Academy Conference and shall attend any other meetings at the A. A. A. S. conventions which he shall deem of interest to the Academy.

Section 2. He shall report at the annual meeting on the meetings of the Council and the Academy Conference.

Article IX.—Editor of the Journal.

Section 1. The Editor of the Journal shall publish the Journal of the Alabama Academy of Science and shall purchase all stationery, programs and other printed matter which he shall distribute to those who are supposed to receive them.

Section 2. He shall also keep in a safe place the Archives of the Academy consisting of back numbers of the Journal, exchange publications, records of the Academy and gifts.

Article X.—Program Rules.

Section 1. Titles and abstracts of papers to be presented at the annual meeting must be sent in duplicate to the Section Chairman of the Section in which the paper is to be presented before the date set by him.

Section 2. The Section Chairman shall send one copy of the title and abstract to the Secretary and one to the Editor of the Journal before the final date set by them.

Section 3. The chairman of the Local Committee shall send to the Secretary before the final date set by him pertinent data concerning local arrangements of the meeting.

Section 4. The Program of the annual meeting shall consist of the following features:

- (a) Meeting of the Executive Committee;
- (b) First Business Session at which will be heard the reports of officers; and committees will be appointed.
- (c) Second Business Session for the reports of Committees, election of officers, selection of the place of the next meeting, etc.
- (d) Sectional meetings which shall be held in the intervals between meetings of the Academy as a whole and should not interfere with them.
- (e) Annual Banquet and Presidential Address followed by a reception.
- (f) Field trips to places of scientific interest.

Article XI.—Amendments.

These By-Laws may be amended by a plurality vote of those present at any annual meeting.

CONSTITUTION OF THE ALABAMA JUNIOR ACADEMY OF SCIENCE*

Article I.—Name

This organization shall be known as the Alabama Junior Academy of Science.

Article II.—Purpose.

The purpose of the Junior Academy shall be the encouragement of scientific work and study among high school students in the state of Alabama, by cooperating with the Alabama Academy of Science.

Article III.—Membership.

Section 1. Membership. The membership of the Junior Academy shall consist of the members of the chapters of the Junior Academy who are in good standing with their respective chapters.

Section 2. Chapters. Each chapter shall consist of the sponsor from the science faculty of a high school together with such students in the school as have met the requirements for membership as laid down in the constitution of that chapter.

Section 3. Application. Science clubs interested in becoming affiliated with the Junior Academy should submit to the Secretary of the Alabama Academy of Science or some member of that body an application accompanied with a list of the club members and a copy of the constitution or constitutions composing that chapter. Applications will be received from any senior high school in the state which is doing at least eleventh grade work. The application will be passed upon by the counselors and officers of the Junior Academy, and election to membership will be made at the next annual meeting.

Section 4. Limitation. Each high school shall be limited to one chapter, regardless of the number of science clubs in the school.

*Adopted at the Eleventh Annual Meeting.

Article IV.—Officers.

Section 1. Officers. The officers of the Junior Academy shall consist of a President, a Vice-President, a Secretary and a Treasurer. These officers shall be elected by the delegates from the several chapters represented at the regular annual meetings of the organization. Candidates for office shall be limited to students who shall be bona fide members of a high school at the next annual meeting.

Section 2. Duties. The above officers shall perform the duties usually pertaining to their respective offices, and in addition give their full cooperation to the Counselors appointed from the Alabama Academy of Science.

Article V.—Dues.

Each chapter shall pay to the Junior Academy an annual fee of one dollar. The initial fee of one dollar shall include the cost of a charter, and constitute the first year's dues. Any chapter in arrears in dues for two years and failing to respond to notification from the treasurer shall be dropped from the Junior Academy and its charter revoked.

Article VI.—Delegates

Each chapter shall be limited to one delegate at the annual meeting. Only the official delegates of the various chapters shall vote on the matters representing the official business of the organization.

Article VII.—Limitations of Expenses

No bills in excess of five dollars shall be incurred by the Junior Academy without the authorization of the Treasurer of the Alabama Academy of Science.

Article VIII.—Bills

No bills against the Junior Academy shall be paid without an order endorsed by the President and Treasurer of the Junior Academy. Books will be audited once a year by a committee from the Alabama Academy of Science.

Article IX.—Meetings.

The Junior Academy shall have an annual meeting with the Alabama Academy of Science at such time and place as that organization shall designate. Local chapter meetings shall be determined by the individual chapters. Additional meetings of any appropriate group of chapters may be held at any time.

Article X.—Ratification.

This Constitution shall become effective at such time as it is ratified by a majority of the chapters in membership by February 1, 1934, and subject to the approval of the Alabama Academy of Science.

Article XI.—Amendments.

This constitution may be amended or revised at the second annual meeting to be held at Mobile in 1934 by assent of a majority of the delegates present and subject to the approval of the Alabama Academy of Science. All Amendments made subsequent to this time must be recommended by a majority vote of the delegates at an annual meeting and accepted by two thirds of the chapters in good standing within three months from the annual meeting.

**ABSTRACTS OF PAPERS PRESENTED
SECTION I
BIOLOGY AND MEDICAL SCIENCE**

PRESIDENTIAL ADDRESS, "RESEARCH, ITS VALUE AND INFLUENCE ON RECOVERY".*

—A. G. Overton, Alabama By-Products Corporation, Birmingham.

THE NUTRITIVE EFFICIENCY OF FATS IN RELATION TO VITAMIN B.

—W. D. Salmon, Alabama Polytechnic Institute.

Rats can live and grow on diets which are practically devoid of vitamin B if these diets contain large amounts of fats. The effectiveness of a fat in decreasing the need of this animal for vitamin B is related to the length of the carbon chains of the fatty acids of which the fat is composed. When the diet contains adequate vitamin B, fats do not rank in the same order of nutritive efficiency as when the diet is free from vitamin B.

Differences in the absorption of the various fatty acid glycerides are too small to explain the differences in the vitamin B-sparing effect of these substances with the exception of palmitic and stearic glycerides. The absorption of fatty acid glycerides from myristin down was 95 per cent or more but the absorption of stearic glyceride was less than 20 per cent.

Studies with the Allison apparatus show that the caproic and caprylic acid content of the brains and livers from vitamin B-deficient animals was lower than of those from normal animals. The most marked reduction, however, seemed to be in the formic acid content. The data seem to indicate the transformation of carbohydrate through formaldehyde to formic acid. It is suggested that vitamin B may function in connection with this transformation.

HUMAN INFESTATION WITH INTESTINAL PARASITES IN SUMTER COUNTY, ALABAMA A PROGRESS REPORT.

—Sidney J. Williams, M.D., Sumter County Health Officer.

Intensive epidemiological studies of hookworm infection and infestation have been made in the Southern states since Stiles' original survey published in 1903. The original survey of Alabama was made in several counties in 1910-1914 by the Alabama State Board of Health with the assistance of the Rockefeller Sanitary Commission. There have been subsequent surveys in Alabama.

The study now being conducted in Sumter County is one of several carried on in the state. Sumter County is located in the Black Belt with a population of 27,000, 78 per cent of which are colored. The survey represents all of the 16 white schools, and 69 of the 76 colored schools. Specimens were obtained from approximately one-fifth of the entire population of the county.

*The Presidential address has been submitted in its complete form for publication in *SCIENCE* and will appear in an early number of that periodical.

From the incomplete results so far it appears that the total incidence of hookworm infestation is much lower than in very recent surveys of other nearby counties. Apparently there is a higher percentage of hookworm infestation among the whites than the colored, although the whites are better equipped with sanitation and certainly more of whom wear shoes than do the colored. Much more ascaris was found among the colored than whites. The incidence of other intestinal parasites was quite low.

The initial survey is nearing completion. Follow-up work is to consist of treatment, re-checks on those treated, and sanitation promotion.

SOME PHASES OF THE LIFE HISTORY OF NUT GRASS, *CYPERUS ROTUNDUS* L.

—George L. Fick* and E. V. Smith, Alabama Polytechnic Institute.

Nut grass is one of the worst weeds of the South. The plant consists of a branching system of rhizomes and tubers; the latter produce aerial sprouts each consisting of a basal cluster of leaves and at flowering a scape bearing flowers in umbels. No viable seed has ever been found at Auburn, reproduction being exclusively by means of tubers. As many as 1600 tubers were found under one square yard of heavily infested land; most of the tubers were found in the surface eight inches and none deeper than sixteen inches.

The formation of rhizomes and tubers by isolated tubers has been carefully studied. This study showed that: (1) new tubers were evident 18 days after planting; (2) under favorable conditions 84 tubers were produced in four months; (3) removal of sprouts as they appeared prevented new tuber formation; (4) the whole system acted as a physiological unit; (5) generally the sprouts originated from the end tubers of a system, the other tubers usually being inactive; (6) such inactive tubers formed sprouts when separated from the system.

Tubers dried under different conditions conducive to varying rates of drying lost their capacity to sprout in all cases when their moisture content was lowered to approximately 15 per cent; exposure of twelve to fourteen days in the laboratory and less than four days in the sun brought about the above condition.

These and other experiments have formed the basis for important experiments dealing with eradication now in progress.

* Deceased February 2, 1936.

REVIEW: BACTERIOLOGY OF LEPROSY.

—Rebie A. Holt, Montgomery Methodist Hospital.

In this paper, an effort is made to review briefly those contributions which bear directly on our newer knowledge of the bacteriology of leprosy. The etiology of this disease is discussed and special reference is made to the cultivation of the acid fast bacillus of Hansen, the variations in its morphology and the amphoteric staining properties of this organism. Also, a brief consideration of the chemistry and immunological studies with *M. leprae* is given.

EDEMA AND GENERAL ATROPHY IN *STENOSTOMUM OESOPHAGIUM*.

—Margaret Hess, Judson College.

The main stem of the protonephridium is the first organ to be destroyed in edema of *Stenostomum oesophagium*. The space between the enteron and the epidermis becomes filled with fluid; the enteron is collapsed and the epidermis is greatly distended. The body parenchyma is largely destroyed in spite of the fact that cells migrate to the parenchyma from both the epidermis and the enteron. The capillary portion of the protonephridium becomes foreshortened and the number of flame cells increases. Experiments to determine the cause of edema indicate that the quantity or the quality of the food eaten is the most important factor.

OBSERVATIONS ON LIVING MESENTERIC CAPILLARIES.

—John H. Ferguson, University of Alabama.

Direct microscopy and micromanipulation of living capillaries in the fresh mesentery of (a) pithed frogs and (b) decerebrate new-born kittens revealed:

1. Independent contractility of mechanically stimulated single capillary endothelial cells, affecting vessel diameter (mechanical contraction of Rouget cells and other pericytes did not affect calibre of capillaries):
2. Absence of correlation between blood flow and capillary diameter, with the suggestion that blood pressure differences between the two ends of the capillary play the major role in regulating blood flow through each particular capillary:
3. Mechanism of capillary thrombosis in relation to type of adhering cell and rate of blood flow. With rapid rate of flow, only the thrombocytes (and a few leucocytes) are able to adhere sufficiently firmly to a point of capillary endothelium which has been injured by the micro-needle. This forms a "white thrombus". With a slow rate of blood flow (physiological or pathological stagnation) the corpuscular elements adhere indiscriminately and tend to form "red" or "hyaline" thrombi.

THE INTERGENERIC HOMOLGY OF A PARTICULAR CHROMOSOME IN SEVERAL CLOSELY RELATED GRASSHOPPERS.

—J. Gordon Carlson, University of Alabama.

In representatives of seven genera of Acridinae, viz., *Chorthippus curtipennis*, *Euchorthippus pulvinatus*, *Stenobothrus lineatus*, *Omocestus ventralis*, *Stauroderus biguttulus*, *Gomphocerus rufus*, and *Aeropedellus clavatus*, there occurs in the meiotic prophase an atypical euchromosome, which is distinguished from its fellows by the large size and deep stainability of its chromomeres. This element also stains more deeply than the other euchromosomes during interkinesis and early spermiogenesis. The atypical chromosomes of a single individual exhibit striking similarity in the number, size, and arrangement of their chromomeres through successive stages of meiosis. All the evidence from cytological study leads to the conclusion that these chromosomes are intergenerically homologous. This is chiefly significant in the support it lends to the theory of chromosome individuality.

In one individual of *S. biguttulus* the atypical tetrad is unequal, because of a deficiency, and it appears always to undergo segregation in the second division.

Splits are shown in the atypical chromosomes previous to synapsis, which begins at the proximal ends of the chromosomes and proceeds distally. All the euchromosomes of the spermatid nucleus show splits in preparation for the first cleavage division of the zygote.

FISH PONDS IN ALABAMA.

—H. S. Swingle, Alabama Agricultural Experiment Station.

There are approximately 1000 small ponds and lakes throughout Alabama which have been constructed by farmers and sportsmen for the purpose of raising fish. These ponds cover a total of over 17000 acres, and vary in size from $\frac{1}{8}$ acre up to several hundred; over 75 per cent, however, are small ponds containing less than 10 acres.

The average cost per acre of impounded water was approximately \$100.00, but where the farmer has done the work himself during his spare time it has been as low as \$5.00 per acre. It is estimated that a total of \$1,700,000 is at present invested in small fish ponds and lakes in Alabama by farmers and sportsmen. In addition there are approximately 70,000 acres of impounded water in lakes constructed for the production of electric power in Alabama (exclusive of TVA developments). These lakes are scattered throughout the State and vary in size from a few thousand acres to 40,000 acres. They furnish food and recreation for thousands of folks yearly.

The catch of fish in these small ponds and lakes varies from a few pounds to 200 pounds of fish per acre yearly. As a rule the small ponds are relatively more productive than the very large ponds. The average catch in ponds and lakes of all sizes was approximately 10 pounds of fish per acre per year. The average yearly catch in ponds of less than 150 acres was approximately 30 pounds per acre distributed as follows: Bream 11 pounds, bass 9 pounds, cats 5 pounds, crappie $3\frac{1}{2}$ pounds, jack 2 pounds. The yearly catch of fresh water fish from ponds and lakes in Alabama is approximately 1,200,000 pounds. This figure does not include the catch from streams or from TVA lakes, as no figures are available upon which to base an estimate.

SOME STUDIES ON THE CLOTTING TIME OF RABBIT BLOOD FOLLOWING INTRAVENOUS ADMINISTRATION OF RICIN.

—Hewell C. Samuel and Emmett B. Carmichael, University of Alabama.

Ricin dissolved in nine tenths percent sodium chloride solution was administered intravenously into rabbits. The quantities given varied from 250 to 500 M.L.D. Blood was taken from the marginal ear vein and by utilizing a modification of the Vierordt method, the clotting time of this blood was taken over a period of four to six hours after the injection.

Immediately after injection an increased clotting time was noted followed by a decrease in clotting time. Then a slow increase occurred until at death the clotting time had increased from about one hundred to about four hundred percent.

NEW FACTS ABOUT SOME WELL KNOWN ALABAMA PLANTS

—Roland M. Harper, State Geological Survey.

Most plant descriptions are made up from herbarium specimens, often by persons who have never seen the plants alive, and in that way important characters are sometimes overlooked.

One of the heart-leaf genus propagates by running rootstocks, and seldom blooms. One of our commonest weeds has a rosette of toothed leaves on the ground in early spring, which usually withers away completely before the plant blooms, and has thus escaped notice. An oak that grows in swamps has acorns light enough to float, and is probably the only oak in the world of which that is true.

A TEST OF LEAD ACETATE AS A "CURE" FOR POISON OAK.

—C. M. Farmer, Troy State Teachers College.

To see (1) if lead acetate is an effective remedy for poison by poison oak, and (2) to see what percentage of persons are immune to poison oak, fourteen volunteer students of biology in the State Teachers College at Troy, Alabama, were exposed by rubbing the cut end of a live poison oak stem on their arms.

All were exposed July 16, 1935, three in forenoon and the remaining ten in the afternoon. By the afternoon of July 16 one showed poisoning and the next day two others were broken out. Two days later two others were slightly affected. The remaining nine never showed any sign of poisoning.

Two were treated with a ten per cent solution of lead acetate as soon as the irritation appeared and seven times thereafter before the inflammation disappeared. The other three received no treatment. By July 23 all were well. The only perceptible effects of the treatment was it temporarily allayed itching. The solution seemed to have no more effect than water.

Conclusions: (1) lead acetate has little or no value as a remedy for poisoning by poison oak, (2) a majority were immune to the disease.

EXPERIMENTAL STUDIES ON BRANCHES OF THE VAGUS AND SPINAL ACCESSORY NERVES IN THE CAT.

—James O. Foley and Franklin S. DuBois, University of Alabama.

Two cats have been subjected to each of five procedures: (1) section of the vagus nerve above the nodose ganglion, (2) extirpation of the nodose ganglion, (3) section of the vagus below the nodose ganglion, (4) section of the superior laryngeal nerve, and (5) section of the recurrent laryngeal nerve. Qualitative and quantitative studies of these preparations and those in which rootlets were sectioned (see DuBois and Foley abstract) have established the number, size and functional types of fibers in many branches of the vagus and accessory nerves.

EXPERIMENTAL STUDIES ON THE VAGUS AND SPINAL ACCESSORY NERVES IN THE CAT.

—Franklin S. DuBois and James O. Foley, University of Alabama.

Various roots of the vagus and accessory nerves have been transected either within or alongside the medulla in fifteen cats. By following resultant degeneration microscopically, the peripheral distribution of bundles of motor fibers has been determined.

Near the medulla the spinal and bulbar accessory and motor rootlets of the vagus are assembled in single file ventral to the sensory rootlets of the vagus. Between the brain stem and the jugular ganglion this strictly dorso-ventral sensory-motor relation is lost as the two types of vagal rootlets unite.

When degenerated, the spinal portion of the accessory can be traced peripherally into the external ramus of the accessory, the bulbar portion of the accessory into the recurrent laryngeal nerve, the most caudal vagal motor rootlet (intermediate in nature between the bulbar accessory and the more rostral vagal rootlets) into the pharyngeal and superior laryngeal nerves and the other vagal motor rootlets into the trunk of the vagus below the nodose ganglion where they disseminate and can no longer be seen. These observations may be interpreted as suggesting a rather definite peripheral distribution for each of the vago-accessory motor roots. Only a part of this complex has been analyzed.

SOME FURTHER OBSERVATIONS CONCERNING THE NATURE OF CONTAGIOUS LYMPHOSARCOMA OF DOGS.

—Herman D. Jones, Alabama Polytechnic Institute.

Six lactating bitches were inoculated subcutaneously in the tissue of the abdomen with the contagious lymphosarcoma during a series of studies. Controls were run simultaneously with the lactating bitches. All six failed to form tumors while all controls developed the tumors in about the normal time. One bitch was inoculated five days before delivery, in the same manner, and failed to form a tumor. Five weeks later this same bitch was inoculated a second time and to date has not developed tumors.

SOME OBSERVATIONS ON THE QUANTITATIVE STUDIES OF THE FEMALE HORMONE, ANTUITRIN-S, IN URINE FROM NON-PREGNANT SUBJECTS.

—Herman D. Jones, Alabama Polytechnic Institute.

A series of studies involving the quantities of antuitrin-S found in non-pregnant urine during the menstrual cycle have been made. These data obtained reveals that fact that this particular female hormone is found in non-pregnant urine in small quantities. The data, plotted days against mgs. per 100 cc. of urine, shows a gradual increase of the hormone excreted from the first day after the stain disappears until the eighth to ninth day when a sharp increase is found. The output increases gradually from this point until the seventeenth to the nineteenth day, the curve assuming a rather flat or gradual trend. From this day until the twenty-eighth day, or the end of the cycle the curve shows a sharp downward trend, returning to approximately the same position as the first day. This indicating that the excretion of the hormone at the end of the cycle is near that of the beginning.

THE USE OF THE POLARIZING MICROSCOPE IN THE DIAGNOSIS OF MYELIN DEGENERATION IN PERIPHERAL NERVES OF THE RAT.

—C. O. Prickett, Alabama Polytechnic Institute.

In studying the effects of experimental vitamin B insufficiency in rats much difficulty has been encountered with the Marchi and Sudan III methods for demonstrating myelin change. The use of the polarizing microscope as a diagnostic method for this work is being investigated and shows great promise. Three phases will be discussed: (1) the extent of normal variation, (2) the study of the transected nerve to determine the progress of degenerative changes for given lengths of time, and (3) the comparison of the normal and transected nerve by the Marchi, Sudan III, and polarizing microscope methods.

LIFE-CYCLE STUDIES OF *CERCARIA HODGESIANA* AND *CERCARIA MELANOPHORA*.*

—Septima Smith, University of Alabama.

The two cystocercous cercaria referred to here were presented with short descriptions at the meeting of the American Society of Parasitologists held in connection with the A.A.A.S. in Atlantic City, December, 1932, and published under the title "Two New Cystocercous Cercariae from Alabama" in the abstracts of that organization. Since that time studies have been made on the life-cycle of these cercariae. These additional findings are presented here along with the original description.

CERCARIA HODGESIANA Smith, 1932

"*Cercaria hodgesiana* has an approximate length of 3.8 mm., the globular bladder being about 1.5 mm. in diameter. It is clear and colorless with a pale yellow distome which averages 1.3 mm. in length by 0.86 mm. in width, and which fills less than half of the chamber. The latter is smooth in contour save for a protrusible terminal papilla at the point of invagination of the distome, and a few small irregularly disposed papillae which surround the same. The anchor flaps are 0.8 mm. in length by 0.7 mm. in width."

Cercaria hodgesiana has been found in only two localities, namely Big Sandy Creek, Warrior River drainage, Tuscaloosa County and Miller Springs, Cahaba River drainage, Bibb County, Alabama, the former being designated as the type locality. The snail host in both instances is *Goniobasis vicina* (Anthony). These two localities, although of different drainage systems, are separated only about seven miles. Evidence of stream piracy has been advanced to account for similarity of molluscan fauna.

The cercaria develops in a redia similar to other cystocercous cercariae. The time of emergence of the cercaria is from about 6 to 8 A.M. in contrast to that of *Cercaria macrostoma*, which is from 7 to 11 P.M. The percentage of infection of the snail host is low, less than one percent. The cercaria lacks that ability to swim which is characteristic of other cystocercous forms, but usually remains attached by means of its comparatively small adhesive furca to the snail host or some nearby object, or settles at the bottom of the aquaria. Here its white refractive form and lashing movements offer a conspicuously attractive object to fish. The distome is

* This research was aided by a grant from the National Research Council.



Photomicrographs of living material. All scales represent 1 mm. Fig. 1. Free-swimming form of *Cercaria melanophora* Smith, 1932. Fig. 2. Free-swimming form of *Cercaria hodgesiana* Smith, 1932, front and lateral views showing distome enclosed in globular tail bladder. Fig. 3. Freshly excysted distome of *Cercaria hodgesiana* Smith, 1932. Fig. 4. *Proterometra hodgesiana* nov. spec. after 120 days development in *Apomotis cyanellus* (Rafinesque).

Abstract of paper at Auburn Meeting, March 20, 1936

very similar to that of *Cercaria macrostoma*, although it is smaller, and the organ structures occupy the same relative positions.

PROTEROMETRA HODGESIANA nov. spec.

Artificial feeding experiments were successful with fish of the family Centrarchidae. The adult undergoes little change in size in the pharyngeal region of the host where it develops, but shows great increase in the development of ova to the miracidial stage. It is placed in the genus *Proterometra* Horsfall, therefore becomes *Proterometra hodgesiana* nov. spec.

CERCARIA MELANOPHORA Smith, 1932.

"*Cercaria melanophora* is approximately 4.2 mm. in length by 1.4 mm. maximum bladder width. It is of striking appearance, with a deep yellow brown distome which averages 1.6 mm. in length by 0.98 mm. in width and which half fills the ovoid enveloping trunk. The latter is diffuse brown and is studded with numerous spinose mammillations. The tail stem terminates in two anchor flaps, 1.12 mm. in length by 1.03 mm. in width, which are conspicuously pigmented in irregular brownish patches."

The type locality is Cooley Creek, Jefferson County, Alabama, and the snail host is *Goniobasis opaca* (Anthony). The adult has been found in *Huro floridana* (Le Sueur) in the same locality and in experimentally infected fish in this and other members of the family Centrarchidae. The adult agrees in all essentials of morphology with *Proterometra macrostoma* Faust.

Horsfall, 1934, considers this species synonymous with *Cercaria macrostoma* Faust. In extensive collections by the author of *Cercaria macrostoma* from Wisconsin, Illinois, Texas, Alabama, Georgia and Florida, considerable variations in size, form and color have been noted which, for a given colony, are characteristic and remain essentially constant. These possibly should be considered as only geographic races of which *Cercaria melanophora* is a rather striking example and which offers an interesting object for further study.

THE SCREW WORM IN ALABAMA.

—J. M. Robinson, Alabama Polytechnic Institute.

It has long been known that the larvae of several species of flies develop in decaying animal tissue. In this capacity they function as scavengers and are known as flesh flies. More recently it has been observed that in the Family Metopiidae, genus *Cochliomya*, the larva of one species is a tissue parasite, since it feeds on the living tissues of birds and mammals. Cushing and Patton (1933) established the fact that *C. masilaria* was a different species from the tissue parasite which they named *C. americana* (C. & P.). However, *C. americana* was described by Coquelet in 1856 as *C. hominivorax*.

The screw worm had caused considerable loss to livestock in Texas for many years. Such losses were not often reported in the southeastern states. In 1933 there was considerable damage to livestock in Florida, Southwestern Georgia, and Southeastern Alabama. In 1934 the Florida, Georgia, and Alabama infestations developed to serious proportions. In August the infestation covered the southern and central counties of Alabama.

Benzole is generally used for the control of the maggots in the wounds. Pine tar is a satisfactory repellent to the adult fly.

There were 44,151 animals reported infested in Alabama in 1934. The question of the possibility of a heavy infestation in 1935 was anticipated. As a result of this cooperative work in Alabama only 9,422 cases of screw worm infestation were reported.

OÖGENESIS AND SPERMATÖGENESIS IN *CERCARIA MACROSTOMA* FAUST, 1918.

—Frances Bryant, University of Alabama.

Anderson, 1935, published an account of spermatogenesis and oogenesis in *Cercaria macrostoma* Faust, from material collected in the Des Plaines River, Evanston, Illinois, the snail host being *Goniobasis livescens* Menke. This study is based upon the same cercaria found in *Goniobasis carinocostata* (Say) by Dr. Septima Smith of the Department of Zoology which were located in the Coosa River drainage, Springville, Alabama, and it extends the work of Anderson and adds certain new features.

Serial sections of the distome were made and stained in iron haematoxylin and Feulgin's. The diploid number of chromosomes was found to be eighteen. The various stages in spermatogenesis found are primary, secondary and tertiary spermatogonia, primary and secondary spermatocytes, spermatids and spermatozoa. The sperm are rather unique in that they are formed in tight coils and gradually straighten out as they mature.

Oogenesis is more difficult to study due to the large number of nutrient cells present in the ovary. With the last gonial division there is growth of the cells which continues throughout the prophase of the first maturation division. The primary oocytes pass into the ootype while in the metaphase of the meiotic division, and it is here that the sperm penetrates the egg and the shell is laid down. This makes the study of further stages most difficult due to the thick egg shell which does not section well. However, the pronuclei have been seen and the first maturation metaphase in which the shell had been broken off. Further study will be delayed until a method for softening the egg shell can be devised.

SOME INTESTINAL PROTOZOA OF MONKEYS (*MACACUS RHESUS*).

—Marshall Eskridge, University of Alabama.

Through the courtesy of Dr. A. D. Keller of the School of Medicine, University of Alabama, permission was given to study the faeces of monkeys of the species *Macacus rhesus* used in his own experimental work in another line.

The protozoa found included those comparable to the well known forms in man, namely, the *Endamoeba histolytica*, *Endamoeba coli*, *Endolimax nana* and *Iodamoeba williamsi* type. Both the monkey and the human forms were demonstrated in order to show the comparison between the two.

PEST MOSQUITO CONTROL, IN ALABAMA UNDER CWA.

—F. E. Guyton, Alabama Polytechnic Institute.

Extensive ditching operations were performed in Mobile and Baldwin Counties in 1933-34 for the control of pest mosquitoes. The principal pest mosquito of these areas is *Aedes sollicitans* Walk. It breeds in saline marsh areas. It is capable of long migrations. The ditches were made in such a way that they drained the marshes completely. The mouth of the ditch was usually at low tide level. Eight hundred laborers and nineteen professional men were employed over a period of 4 months. The laborers averaged 550 men per day for 47.5 days. During this period 749,918 linear feet of 20" wide ditches were dug, giving a displacement of 2,519,527 cu. ft. of dirt. The cost of the entire project was \$91,816.30 or .036 cents per cu. ft. of dirt removed.

The writer inspected the ditches in 1934 and 1936 and found them to be in good shape, giving almost perfect drainage and mosquito control in the ditched areas.

NEW FACTS ABOUT THE ECONOMIC LEGUME, *CROTALARIA SPECTABILIS*.

—J. F. Duggar, A. P. I. Experiment Station.

Recent experimental data obtained by colleagues in this Station have indicated the high value of an early variety of this annual, erect, branching summer legume for soil improvement.

Some of the characteristics of the early variety of *Crotalaria spectabilis* employed in the writer's 1935 experiments at Auburn are unique. These unique qualities, even though ordinarily in the class of handicaps, may be turned to the farmer's advantage. For example, many of the seeds of *crotalaria* are hard, remaining unspouted but viable in the ground for months, some of them apparently for years. Hence once thickly seeded in a field of corn, a crop of later or volunteer plants springs up after cultivation of corn ceases and again the next season. In 1935 planting made as late as July 11 resulted in the maturing of an abundant crop of seed before frost, November 23. About 135 days between planting and frost seemed necessary to satisfactory seed production.

On maturing, the pods dehisce violently. Our counts showed that a few seeds were thus thrown as far as 14 feet. From 7 to 4 per cent were found in successive foot-wide bands 4, 5, 6, and 7 feet away from the parent plant; the seeds were lodged very thickly in the first, second, and third feet.

Crotalaria coming up with corn, the legume hills spaced 3, 6, and 9 feet apart in every corn row, afforded at all spacing abundant seed crops, up to nearly 500 pounds per acre.

Scarifying the seed for planting usually increased the thickness of stand and the seed yield. Deep planting was found extremely harmful. Practically no seed emerged from a depth of 6 inches, only about 32 per cent from 4 inches, and about 60 per cent when covered with only 2 inches of sandy soil. Even shallower planting is sometimes advisable.

SOME EFFECTS OF VARIED SOIL MOISTURE ON THE NUMBER OF ROOT NODULES ON WINTER LEGUMES.

—J. F. Duggar, A. P. I. Experiment Station.

Austrian winter pea, and hairy, Hungarian, and woolly-pod vetches were grown from November to March on plots (1) exposed to all rainfall and (2) protected against rain by removable canvas covers. Counts of root nodules when seedlings were 1, 2, 3, and 4 months old showed that as an average for all species and all prior fertilizer treatments, practical halving of the percentage of soil moisture reduced the nodules per plant to about one-third of normal. This held true for plants aged 2, 3, and 4 months.

The kind of prior fertilization notably affected nodule numbers. Superphosphate was especially favorable to nodulation, and the addition of potash further materially augmented the number of nodules.

Under eight conditions of fertilization and moisture supply, yields of forage and number of nodules per plant, especially at plant ages of 2, 3, and 4 months, increased together.

FURTHER OBSERVATIONS ON ENHANCED APPETITE WITH RESULTANT ADIPOSITY FOLLOWING REMOVAL OF THE POSTERIOR LOBE OF THE HYPOPHYSIS.*

—A. D. Keller and W. Noble, University of Alabama.

The pars intermedialis, infundibular process complex was successfully removed in two dogs without apparent injury to neighboring structures. Dog 499 B exhibited a markedly enhanced appetite both for milk and solid food which continued until a new body weight was reached, by the disposition of fat, after which the food intake returned to normal. Dog 539 B exhibited a typically enhanced appetite for only a few days after operation. It seems probable that a small portion of the pars intermedialis (?) remained.

Enhanced appetite with adiposity resulted in Dogs 550 B and 566 B, in which it was attempted to macerate the pars tuberalis leaving the anterior lobe with a view of testing our belief that the pars tuberalis is the source of the antidiuretic fraction of pituitrin. A portion of the pars tuberalis remained in both instances. In Dog 550 B there was a characteristic shrinking of and cellular proliferation in the posterior lobe with intact anterior lobe. Dog 566 B was typical of the dogs described by Cushing where a small portion of the anterior lobe remained and the whole of the posterior lobe was lacking. Adiposity has not occurred under any conditions with total removal of the anterior lobe.

Enhanced appetite with adiposity was also encountered in Dog 520 B in which the hypothalamus was separated from the hypophysis except for a small region in the caudal portion of the infundibulum by a lesion in the ventral tip of the hypothalamus. Characteristic cellular proliferation was present in the infundibular process. It appears however that the infundibular process is not concerned since in Dog 567 B which showed no deviation from the normal the infundibular process showed this same reaction following a small transverse lesion in the hypothalamus, at the caudal level of the optic chiasm.

Adiposity and diabetes insipidus which follow hypothalamic lesions are not simply the result of removing nerve fibers which pass to the hypophysis via the infundibulum since a clean separation of the hypophysis from the hypothalamus does not precipitate either of these dysfunctions even transiently. Diabetes insipidus does however occur if after separation the proximal portion of the hypophysis is destroyed by crushing or cautery.

* Read by title.

EXTIRPATION EXPERIMENTS WHICH DEMONSTRATE THAT
THE NEOCEREBELLUM IS NON-ESSENTIAL, FOR ANY
FUNCTIONS PREVIOUSLY ATTRIBUTED TO THE CEREBELLUM.*

—A. D. Keller, R. S. Roy, and W. P. Chase, University of Alabama.

The demonstration of the non-essentiality of a brachium conjunctivum for the execution of coordinate muscular movement in the monkey raised most prominently the question as to whether the neocerebellum mediates the functions that have been attributed to it. With attention focused upon postural attitudes the following procedures were accomplished without precipitating any type of dysfunction in the dog: (1) section of the pentile brachia, (2) section of a brachium conjunctivum, (3) complete unilateral removal of the neocerebellar cortex (the whole of the middle lobe of Ingvar, and in addition, the paraflocculus lobule) with sufficient infringement upon the lateral nuclei to degenerate the brachium conjunctivum as evidenced by marchi staining.

The abolition of the neocerebellum unilaterally without precipitating symptoms might indicate bilateral control from the opposite hemisphere. This is not the case since a subsequent removal of the remaining neocortex has been accomplished without precipitating either crossed or homolateral disturbance.

In the light of the existing view that the cerebellum acts as a whole, decortication of the neocerebellum without disturbance might indicate the ability of the anterior and posterior lobes (of Ingvar) to carry the necessary function. If such were the case one would expect the lateral lobes to carry the necessary load following removal of the vermis. Such a reciprocal relationship does not exist because removal of the vermis as a whole or the medial nuclei alone leaving the lateral lobes and nuclei intact precipitates typical cerebellar symptoms.

Transitory symptoms which frequently precipitate following lateral lobe removals but which are clearly due to neighboring involvement are: vestibular, leaning and staggering to the contralateral side or actually rotating when there is more extensive involvement; and vermis, staggering to the homolateral side with an overraising of the limbs in walking—usually more prominent in the fore leg but at times more prominent in the rear leg. In the monkey overreaching and postural and spontaneous tremors may appear even in the absence of postural involvements.

* Read by title.

SECTION II CHEMISTRY, PHYSICS AND MATHEMATICS

PREPARATION OF DERIVATIVES OF A NEW SERIES OF SULFUR DYES.

—George D. Palmer, Jr. and S. J. Lloyd, University of Alabama.

Preparation of a new series of sulfur dyes by contact of molten sulfur with the vapors of organic compounds has been previously reported. (I. Preparation of a New Series of Sulfur Dyes—George D. Palmer, Jr. and S. J. Lloyd. *J. Am. Chem. Soc.*, 3388, (1930).) Derivatives of these sulfur compounds have been prepared by treatment separately with concentrated and fuming nitric and sulfuric acids. Attempts to prepare derivatives with other reagents have met with little success.

CHEMICAL PRINCIPLES IN THE PRODUCTION OF A SELF FLUXING HARD SURFACING ROD.

—C. A. Basore and Dan T. Jones, Alabama Polytechnic Institute.

The rod consists of a high carbon steel core heavily coated with an external layer consisting of essentially manganese, chromium, iron, carbon and borax. The rod is not only self-fluxing but also can be made cheaply since no melting, refining or casting is required as is the case of cast rods.

Water glass is used as the binder for the coating of this rod and is not only effective for this purpose, but because of its colloidal properties it also protects the carbon during the application of the rod and makes it possible to produce a high carbon alloy of low melting point, and one that melts very quietly with little sparking.

The borax, assisted by the excess carbon at the high temperature employed, rapidly attacks and destroys rust that may be on the base metal. Consequently no preliminary polishing or cleaning of the base metal is required. The proportions of chromium, manganese, iron, etc. in the coating are adjusted so that the coating has a melting point practically the same as the core and on melting gives an alloy steel of definite composition. Normally the steel core is provided with a coating consisting of 50% iron, 41.4% ferro-manganese and ferrochrome and the remainder carbon and borax. As a rule the ratio of core to coating is 1:1. The metals present in the coating apparently act as deoxidizers and with proper technique a dense compact structure practically free from blow holes is secured.

Advantages of the rod are its low cost, high speed of application (electrical), low current consumption, ease with which the necessary "bond" is secured between the base metal and the rod and its low temperature of deposition (2000°F-2200°F) which means that there is the minimum change in the grain size of the base metal and danger of burning or warping is reduced to a minimum.

THE DETERMINATION OF ABSOLUTE SINGLE ELECTRODE POTENTIALS

—John Xan and P. R. Bell, Howard College.

This method uses a condenser of variable capacity, one plate of which is the solution in which the electrode is immersed, the other a copper plate suspended over the solution. The condenser is charged to the potential generated by the electrode by connecting the electrode to the plate and contains a small quantity of electricity. When the switch is opened this quantity of electricity is fixed. If the plate is moved away from the solution, thus decreasing the capacity of the condenser, the voltage between the plates of the condenser increases. By setting a potentiometer in series with the switch to give voltages opposite to the electrode voltage and repeating the process, a balance may be obtained. The potentiometer reading will then be equal and opposite to the single electrode potential of the metal in the solution.

The chief difficulty in this method is in obtaining a detector of sufficient sensitivity which requires practically no current.

A vacuum tube voltmeter was used. It has a three stage direct coupled circuit, operated with the grid of the first tube at floating potential.

The voltages generated by contacts in the apparatus and by the contact between the wire and the electrode are determined by substituting a plate of the metal of the electrode in place of the solution, then by the same process as before determining the difference of potential between the plates of the condenser and subtracting this from the previous determination.

A number of difficulties appeared—first an instability of the vacuum tube voltmeter due to fluctuations of the supply line voltage, then a peculiar double deflection of the meter, first in one direction, and then the other, which deflection was found to be due to induced voltage from the 110 volt circuit near the instrument.

The potential of the saturated calomel half cell has been measured and found to be from 0.3 to 0.4 volts positive with respect to solution.

THE USE OF POLARIZED PLATINUM ELECTRODES IN THE STANDARDIZATION OF CERIC AMMONIUM SULFATE SOLUTIONS.

—James L. Kassaner and A. B. Anderson, University of Alabama.

Polarized platinum electrodes have been used to indicate the equivalence point in the standardization of ceric ammonium sulfate solutions using the following primary standards: sodium oxalate, arsenious oxide, and electrolytic iron. The Ceno-Kassner Titrometer was used in this work. The effect of varying the potential on the grid of the vacuum tube, the acidity of the solution and the use of different catalysts on the titrometer. The titrations can be carried out more rapidly with polarized electrodes than with the monometallic system, although the end point comes with the same drop in each case.

OBSORPTION OF WATER VAPOR AND HYDROGEN ON ACTIVATED NICKEL, HYDROGENATION CATALYSTS.

—Kenneth W. Coons, University of Alabama.

A study is made of the absorption of water vapor on supported nickel carbonate catalysts. It is experimentally shown that the absorption constants reach a maximum during the progress of the activation by hydrogen.

The constants of the Freundlich equation are determined, and absorption equilibrium curves are developed for hydrogen and for water vapor in contact with activated nickel catalyst. The rate of activation and the resultant activity of the catalyst are functions of the partial pressure of water vapor in contact with the catalyst during activation.

A new method of carrying out the activation is presented which makes it possible to produce catalysts of uniform activity regardless of the batch size.

THE EXPLOSIVE REACTIONS OF ALUMINUM WITH CERTAIN SULFATES—NON-NITROGENOUS EXPLOSIVES.

—Jack P. Montgomery, University of Alabama.

A detailed study was made of the reactions of powdered aluminum and anhydrous copper sulfate. A more casual study was made of the reactions of powdered aluminum and anhydrous sulfates of Zinc, Iron, Ammonium, Mercury, Sodium, and double sulfates, respectively.

Various molar proportions of aluminum and copper sulfate were mixed and heated in (a) closed test tube, (b) covered crucible, (c) open dish. Proportions of aluminum to copper sulfate from 1:1.6 to 1:4.7 exploded when heated in open dish. Proportions from 1:1.6 to 1:16 exploded in the closed test tube. Proportions from 1:1.6 to 1:9.4 exploded in the covered crucible. The explosion was not initiated by shock but by heating. Tem-

perature necessary for initial reaction ranged from 350° to 425°. Reaction temperatures were 550° to 650°. Products were cupric oxide, cuprous oxide, copper, aluminum oxide, aluminum sulfate, sulfur dioxide, and traces of sulfur trioxide.

Positive explosive results were obtained with the other sulfates mentioned in paragraph I.

A STUDY OF THE PREPARATION AND PROPERTIES OF THE BENZOYL DERIVATIVES OF NINE OF THE AROMATIC AMINES.

—Herman D. Jones and James Franklin Moore, Alabama Polytechnic Institute.

The isolation and identification of active bases in hair and fur dyes has been a long and laborious task. There has been no standard method used for these compounds. The bases used, are usually one of eight or nine of the aromatic amino compounds, namely, ortho, meta, and para phenylene diamine, the ortho and para phenols, 2-4 di amino phenol, 2-5 di amino toluene, 4 amino di phenyl amine and para amino acetanilide.

The benzoyl derivatives of these compounds have been made by use of the Schotten-Baumann reaction. The physical properties, particularly their melting points, crystalline forms and nitrogen content have been determined and these data recorded as a means of aiding in the identification of the bases.

PROPERTIES OF ACORN OILS.

—Anna E. Church, University of Alabama.

Since thirty species of *Quercus* (Oaks) have been found in the state of Alabama, this state offers an exceptional opportunity for the comparison of products of these trees. In 1919 an assay was made at the Texas Agricultural Experimental Station on acorn kernels from several species of oak. This study has been extended and confirms the fact that acorns of the black oak group contain a much higher percentage of lipid material than those of the white oak group. The oils were obtained by extraction of the ground kernels with petroleum ether in the cold. Those from several of the black oak group were analyzed and found to be similar to olive oils with respect to specific gravity, refractive index, saponification number, free fatty acids, and iodine number. The oils obtained from the acorns of the water and willow oak group and from the Red Oak, *Q. falcata*, were consistently deeper in color. The pigment was found to be mainly carotene with small quantities of xanthophyll. The carotene was determined by colorimetric assay and the growth promoting or vitamin A activity was checked by feeding experiments or rats. Oils from the acorns of *Q. falcata*, Red Oak; *Q. obtusa*, Water Oak; *Q. nigra*, Water Oak; *Q. laurifolia*, Laurel Oak; *Q. Phellos*, Willow Oak, were found to contain more than 600 international units per gram of vitamin A, accepting 0.6 gamma B-carotene as equal to 1 international unit and assuming that all carotene in these oils is present as B-carotene. These oils then would be comparable in potency to U. S. P. cod liver oils.

THE LORENTZ TRANSFORMATION AND ITS GEOMETRICAL INTERPRETATION.

—Henry Gerhardt, Mobile.

The classical mechanics of Galileo and Newton are valid for a Galileo coordinate system. Newton's principle of relativity is also valid for such a Galileo system, but it contradicts the constancy of the velocity of light.

Lorentz tried to eliminate the contradiction with his contraction theory, substituting the so-called Lorentz transformations for the Galileo transformations. Einstein showed that a new conception of time and space would remove this contradiction, and thus developed his special theory of relativity.

The Lorentz transformation, which contains implicitly the whole of the special theory of relativity, has a physical and a geometrical interpretation. It creates a relation between the place and time of different events in such a way that the velocity of light remains constant.

In the present paper there is given a geometrical interpretation of the Lorentz transformation.

In geometry the so-called rigid transformations determine the nature of the system. The absolute figure, which is invariant to rigid transformations, will represent the different geometries. If the rigid transformation will leave a cone unaltered, the geometry of space will be pseudoeuclidean.

Galileo transformations will assume a world structure with a Euclidean geometry; Lorentz transformations, one with a pseudoeuclidean geometry.

Lorentz transformations correspond in a four dimensional space to a transformation with new axes by rotation.

INTERACTIONS OF SULFUR WITH SOME POLYHYDROXY ORGANIC COMPOUNDS.

—Jack P. Montgomery, University of Alabama.

Sulfur was heated with glucose, cellulose, starch, and sucrose, respectively, the hydrogen sulfide evolved in each case determined, and an examination made of the residues. Temperatures above 300° were not employed.

In the case of glucose, the evolution of hydrogen sulfide was such as to indicate that five hydrogen atoms were removed from each molecule. Examination of the residue indicated five sulfur atoms per 6 carbon atoms.

In the case of cellulose the indication was three hydrogen atoms, per six carbon atoms, removed, and five sulfur atoms in the residue.

In the case of starch, upon the same basis of six carbon atoms, four hydrogen atoms were removed and five sulfur atoms were in the residue.

In the case of sucrose five atoms of hydrogen per twelve atoms of carbon were removed.

A COMPARATIVE STUDY OF THE QUANTITATIVE DETERMINATION OF VITAMIN C BY THE MAGNETO-OPTIC METHOD AND RECENT COLORIMETRIC METHOD.

—Herman D. Jones and R. E. Wingard, Alabama Polytechnic Institute.

The Magneto-Optic Method of analysis has been applied in the quantitative determination of ascorbic acid (Vitamin C) and the results checked against those obtained by use of the method of Trauber and Kleiner as given in the Journal of Biological Chemistry, February, 1936. The results

are found to be in close agreement. Fruits and also tomato juice obtained in the local markets were used for these studies.

The most pronounced minimum characteristic of vitamin C has been located at -5.46 on the Allison Scale. The sensitivity determined for both observers was found to be 2.1×10^{-12} and 3.12×10^{-12} respectively. All analyses were checked by both observers and were run as complete unknowns.

The following are representative results:

Sample	Magneto-Optic Method mgs. per 100 gms.	Colorimetric Method mgs. per 100 gms.
Lemon Juice	68.7	68.7
Orange Juice	52.5	49.5
Lemon Juice	76.7	77.38
Orange Juice	53.2	52.2
Orange Juice	53.2	58.0
Tomato Juice	23.6	24.7

The advantage of the Magneto-Optic Method over other methods is that no precipitants, reducing agents, or filtrations are necessary. When one's sensitivity is once determined, only about 30 or 40 minutes are required for each determination. Further analyses are being made.

STUDIES OF ISOTOPES BY THE MAGNETO-OPTIC APPARATUS.

—Roy Goslin, Alabama Polytechnic Institute.

Since the magneto-optic apparatus gives a minimum for each isotope of the cation of an element, it is especially adapted to studies of isotopes. The results of such studies will be given for the isotopes of many elements. The minima characteristic of the various isotopes of an element make their appearance in the correct order of abundance, but not in a manner to give the absolute abundances of the isotopes directly. The more abundant isotopes exert an influence on the lesser abundant isotopes to make them appear to be more plentiful than they really are. The results of experiments designed to measure this isotopic influence will be shown for the case of the calcium isotopes. A preliminary report will be made concerning a method of measuring the absolute abundance ratios of the calcium isotopes.

PHOTOGRAPHY OF MINIMA IN THE MAGNETO-OPTIC APPARATUS.

—Gordon Hughes, Alabama Polytechnic Institute.

A photographic technique has been developed to observe the minima of light intensity in the Magneto-Optic Apparatus. The results of over 2300 pictures taken in this investigation have demonstrated that the minima of light intensity are real, reproducible and characteristic of the compound present in the apparatus. The measured change in light intensity for a minimum is 0.7%.

A STUDY OF THE PRODUCTS FORMED WHEN SECONDARY AMINES REACT WITH ALDEHYDES.

—Herman D. Jones and Julius D. Capps, Alabama Polytechnic Institute.

The literature gives very little information on the reactions and products formed when secondary amines are allowed to react with aldehydes. Mono methyl aniline and normal butraldehyde were selected for this particular study. They were brought together in different molar proportions and allowed to react under various conditions. The product of the reaction was then isolated, and purified. The structure and some of the physical and chemical properties were determined and new derivatives made. The nitrogen content of the isolated compound and all derivatives made from it was determined and the possible correct structures assigned to each.

FORMS OF EUCLIDEAN SPACE.

—Henry Gerhardt, Mobile.

The axioms of geometry are laid down for a restricted region, and they will determine the metrical basis for such a restricted region, but not necessarily for an unrestricted region also.

The problem arises of finding the different space forms where, in the neighborhood of each point, the geometry is identical with the geometry of a restricted portion of the Euclidean plane.

These forms have been investigated by Clifford, Klein, and Killing, and have the form of a cylinder and of a Clifford surface. It is the purpose of this paper to discuss the Clifford surface, and to show that there exists a surface with a finite extent where Euclidean geometry is valid around every point, and also to show that the conception of finite space is not incompatible with Euclidean geometry.

LIMESTONE CEMENTS.

—Alfred Marsh, Jacksonville Teachers College.

The research was conducted in order to find a cement that would be suitable for patching cavities and defects in limestone. A large number of aluminate cements were tested. Although many of these have excellent properties, no binary aluminate, no member of the ternary system Al_2O_3 - SiO_2 - CaO , or any of the complex aluminate cements have much strength at the end of an hour.

Salts that accelerate the setting of Portland cement do not give it the desired bonding power. Magnesium oxychloride cements prepared from magnesite burned at a low temperature crack badly on drying.

The cement that was finally found to be fairly suitable was prepared by adding sodium silicofluoride to limestone aggregate and silica and mixing it with concentrated water glass. This gave a cement that (1) had the desired color, (2) was insoluble in water, (3) held aggregate well in 75 minutes, and (4) was low in cost.

A PRELIMINARY REPORT ON THE DRYING PROPERTIES OF BAGILUMBANG OIL.

—E. V. Jones, Birmingham-Southern College and Soochow University.

The table gives results of preliminary tests on relative rates of absorption of oxygen. Figures represent percentage gains in weight.

	at 110°C in bulk	thin films at room temp.
Bagilumbang oil	-3.8 in 28 hrs. and still losing	10 in 100 hrs.
Linseed oil	1.1 in 10 hrs.	13.6 in 112 hrs.
Tung oil	3.1 in 20 hrs.	13.5 in 160 hrs.
	thick films + .5% PbO	thick films + .1% Co as Co (Ac) ₂
Bagilumbang oil	12.6 in 185 hrs.	7.4 in 192 hrs.
Linseed oil	8.0 in 300 hrs.	5.5 in 192 hrs.
Tung oil	14.3 in 300 hrs.	6.3 in 192 hrs.

Two-gram bulk samples were heated in 100 cc breakers.

In plate film drying there was clear evidence that temperature, film thickness, and possibly moisture affected the oxygen absorption rates. The thin films above averaged 0.2 mg per sq. cm. For films up to 1.0 mg, the oxygen absorptions seemed nearly equal. For thick films ranging from five to ten mg there seemed to be very marked differences. Whereas the film thickness seemed to have little effect on linseed oil a tenfold increase in the film weight for the other two oils very markedly lowered the absorption rates.

Bagilumbang oil seemed to take the above driers more readily and the drying rate seemed to be much more rapid.

BAGILUMBANG OIL—A NEW DRYING OIL.

—E. V. Jones and Wei-Tsung Kaung, Birmingham-Southern College and Soochow University.

Bagilumbang oil, obtained from nuts grown in the Philippine Islands is proposed as a substitute for tung oil. A sample of the oil, obtained by ether extraction gave the following constants:

	Mau- acid no.	iodine no.	mene no.	melting pt.	N _D	sp. gr.	sap. no.	uasap. value
Bagilumbang oil	11.4	88	97	-11°C	1.4774	.9366	279	.87
Linseed oil	6.0	194	118	-25	1.4816	.9360	194	1.50
Tung oil	2.9	170		+2	1.5178	.9414	192	.80

Effects of heating on refractive indices N_D²⁵.

	after 42 min. at 200°C	84 min. at 200°C	42 min. at 250°C	84 min. at 250°C
Bagilumbang oil	1.4774	1.4774	1.4774	1.4774
Linseed oil	1.4816	1.4819	1.4822	1.4839
Tung oil	1.5178	1.5153	1.5131	jelled at 25 min. N _D 1.5100

SECTION III

GEOLOGY, ANTHROPOLOGY AND ARCHEOLOGY

THE HOG MOUNTAIN GOLD MINE.

—Stewart J. Lloyd, University of Alabama.

The devaluation of the dollar in 1933 whereby an ounce of gold can be exchanged for some 35 dollar bills instead of 20 dollars and a fifty cent piece, naturally revived interest in the long slumbering gold mines of the southeast, from Maryland to Alabama.

Only one of these however, has so far become a genuine producer, the Hog Mountain property in Tallapoosa County, Alabama, which turned out over \$100,000.00 in gold in 1934, and a much larger amount in 1935. The values are found in quartz veins, throughout a granite plug. It is a small but modern mining plant and this property will develop into one of the large low grade gold mines of the continent.

GEOLOGY OF CHEWACLA STATE PARK.

—Walter B. Jones, State Geologist of Alabama.

Geology. Chewacla Park is located on the fall line between the Piedmont Plateau, composed of crystalline rocks, and the Coastal Plain, which is made up of more or less unconsolidated beds of the Tertiary and Cretaceous. Exposed in the park area are the Archean (undifferentiated), Hollis, Chewacla and Tuscaloosa formations.

Tuscaloosa. Outliers of this formation, of Upper Cretaceous age, are to be found on top of the higher hills in the region. The Tuscaloosa is composed of unconsolidated sand, sand and gravel and buff to mottled clays. The thickness might be estimated at 50 to 100 feet. The Tuscaloosa formation was deposited along the ancient shore line of the Gulf of Mexico.

Chewacla Marble. This formation, which consists of metamorphosed dolomite and limestone with occasional siliceous layers, is infolded into the Archean. The dip, strike and contact vary considerably, but the regional trend of northeast-southwest strike holds true. Apparently, the dip varies mostly from the vertical. Good exposures of the Chewacla are to be found on both sides of Chewacla Creek near the SW corner of the SE $\frac{1}{4}$ of the NE $\frac{1}{2}$ of S. 18. This is the type locality of the formation. The Chewacla occupies a flat to gently rolling valley. The formation is thought to be Algonkian in age, and similar to certain calcareous beds within the Talladega series along the northwest part of the Crystalline area.

Hollis Quartzite. This formation is composed of thin layers of white quartzite and light colored schistose rocks largely made up of white to deep pink feldspar. In some parts of the formation, the schistose layers are wrinkled, thus showing adjustments which accompanied the stress and strain during the process of infolding. The average thickness of the individual layers appears to be about two inches. The strike conforms to the northeast-southwest trend, while the dip varies slightly from the vertical. The formation is weather-resistant and occupies a prominent ridge, which towers sharply above the Chewacla area on one side, and sloping gently over the Archean to the Moore's Mill Creek on the other side. The thickness was calculated to be about 495 feet. The Hollis is considered to be Algonkian in age and may be the same as the Cheaha sandstone member of the Talladega formation.

Archean. In the park area, these beds are made up of metamorphosed rocks, of which augen gneiss and hornblende gneiss with varying amounts of orthoclase feldspar, are the most abundant. These beds vary from thin to massive bedded, compact, fine grained rocks. The exposures of augen gneiss are particularly fine. The beds parallel the ridge of Hollis quartzite, and the dip is not far off the vertical. The Archean beds surround the infolded levels of Hollis and Chewacla, and are of great thickness. The age of the Archean rocks has not yet been determined.

THE USE OF HEAVY SOLUTIONS IN GEOLOGICAL AND ORE DRESSING EXAMINATIONS.

—J. R. Cudworth, University of Alabama.

This paper includes a discussion of the chemicals particularly suited for specific gravity fractionations of ores and rocks. It describes the characteristics necessary to meet the requirements of the more common ores and rocks. Heavy solutions are discussed with the procedure for recovering the solutions after tests.

The technique of operation is covered particularly with regard to ores and the type of information obtained from the tests is described.

A table is included giving desirable solutions for specific gravity determinations of a number of common minerals. A bibliography of the publications on heavy solutions is contained in the paper.

MANGANESE ORE DEPOSITS OF ALABAMA.

—C. S. Blair, Black Diamond Coal Company.

The revival of manganese ore mining brought about by the World War caused a detailed examination of all domestic manganese ore deposits throughout the entire United States, with especial attention given to Alabama in view of its importance as a steel making center. Manganese ore occurs at many widely scattered points throughout Alabama, but important commercial production has been limited to some four or five deposits, which are listed herewith in their general order of importance:

Walnut Grove District:

Blount-Etowah Counties. Deposits of pyrolusite in weathered clays overlying Warsaw limestone and Ft. Payne chert.

Blufftown-Rock Run District:

Cherokee-Cleburne Counties. Manganiferous ores in clays overlying Knox Dolomite and near contact of Shady Limestone and Weisner Quartzite.

Coastal Plain Deposit:

Autauga-Chilton Counties, vicinity of Jones and Maplesville, Alabama. Manganiferous sandstone capping higher plateaus over wide area.

Odena, Alabama:

Deposit of pyrolusite and wad in chert and clays overlying Knox Dolomite adjacent to Talladega fault.

Brief description is given of these various districts and the more important individual deposits. It is suggested as method of origin that the ores are chiefly a concentration of manganese derived from the limestone in the residual overlying clays especially at contact of the limestone with cherty or highly silicious beds.

THE PETROGRAPHY OF WHITEWARE.

—T. N. McVay, University of Alabama.

White Ware is usually made from a mixture of clay, potter's flint, and feldspar fired until it is well vitrified. In this condition the body might be described as an artificial rock. It is the purpose of this paper to discuss the reactions taking place in heating and the relations of the minerals formed in the body at high temperatures. The experimental work has consisted of a petrographic study and also the thermal expansion characteristics of the fired raw materials as well as the fired product.

A DEEP-SEATED EARTHQUAKE AND ITS GEOLOGICAL IMPLICATIONS.

—A. J. Westland, S. J., Saint Louis University.

Convincing evidence for the existence of deep-seated earthquakes has been accumulating over a period of some eight or ten years. Today it seems quite certain that we have seismograms of earthquakes that have originated at depths as great as 700 kilometers beneath the earth's surface. While we have no certainty on the mechanism of their causation, the very existence of such earthquakes may lead to the adoption of new working hypotheses regarding mountain building, isostatic equilibrium and related phenomena in the field of geology.

ZEUGLONDON, A RESUME.

—E. F. Richards, University of Alabama.

This paper presents a resume of the literature describing discoveries of Zeuglodon remains in Alabama. This animal was at first thought to be a reptile. Owen later showed that it was a primitive cetacean. Its bones were found in southwestern Alabama in great numbers by the early settlers. They also occur in other parts of the coastal plain of the United States, in Europe, North Africa, England and New Zealand. Related forms have been found in the upper Eocene of North Africa. Zeuglodon represents an interesting development from primitive, terrestrial life to highly specialized marine adaptation terminating with extinction by the end of the first epoch of the Age of Mammals.

THE URN-BURIAL CULTURE ON THE TALLAPOOSA RIVER, ALABAMA.

—Peter A. Brannon, Department of Archives and History, Montgomery.

The speaker presented some fifty slides illustrating the work of the Alabama Anthropological Society at a site at the junction of the Coosa and Tallapoosa Rivers. Seven distinct culture evidences may be seen at this point, but only the Burial-Urn Culture was primarily discussed. This custom which reached its zenith on the upper waters of the Alabama River, he believes was a practice of the people later known in history as the Alibamo (Alabamas). The practice of Burial in Urns extended down into the historic period, but only five ten thousandths of one per cent of burials show evidence of contact with Europeans. This ratio is computed from

more than two thousand urns taken out. This site was in historic days Taskigi, and had intimate relations with the traders both on the Atlantic Coast and through Pensacola after 1680.

Burial-urns on the Tallapoosa appear to have been set into old pits. In practically every case this burial was either on or by the side of older culture-evidences. The urns in the majority of the cases are large domestic vessels, generally from ten to thirty inches in diameter and the covers are in most cases bowls of superior ware. The speaker illustrated examples of the Ceramic Art showing incised, inscribed and embossed designs, as well as very interesting types of painted ware, quite suggestive of a Trans-Mississippi influence. None of the vessels at this point are trade objects, (the clay being native), but they do suggest an influence or a contact with the celebrated Ohio and Wisconsin cultures, and the Arkansas cultures, and associated with these burial-urns are typical Algonquian-like objects.

LONGEVITY OF AMERICAN GEOLOGISTS.

—Roland M. Harper, State Geological Survey.

From dates of birth and death given in the U. S. Geological Survey bibliographies, and elsewhere, for over 500 geologists, the average longevity at different times has been calculated. There are also interesting variations between those who worked in different parts of the country and in different branches of geology.

SPECIES OF ELPHIDIUM AND AMPHISTEGINA FROM CHOCTAW BLUFF, ALABAMA RIVER, ALABAMA.

—Winnie McGlamery, State Geological Survey.

At Choctaw Bluff on the Alabama River, Clarke County, Alabama, the lowest beds are composed of a hard cream-colored argillaceous limestone, about ten feet in thickness, with patches of soft marl at the top. Above the limestone are steel gray clays of Miocene age. The hard limestone was first correlated with the Jackson, but more recently with the Byram or upper Oligocene. There is a large and well preserved Foraminiferal and Ostracode fauna, especially in the soft marl at the top of the limestone. The mollusks are chiefly in the form of casts. This is the type locality for *Echinolampus aldrichi*, and the Museum collections contain some fine specimens of this echinoid.

A study of the Foraminifera shows the following forms to be persistent and abundant throughout the thickness of the limestone: *Elphidium chipolensis*, *Amphistegina chipolensis* and other species of *Elphidium*. On account of the presence of these and associated forms which are characteristic of the Miocene of Florida, I believe this limestone to be Miocene in age. As a further connecting link with the Miocene of Florida, a horizon carrying a similar association of Foraminifera occurs in a recent well near Bay Minnette, Baldwin County, Ala., at approximately 1000 feet.

A REVIEW OF PETROGRAPHIC AND MICROSCOPIC STUDIES
MADE ON COAL.

—Leland I. Cothorn, University of Alabama.

The microscope is now a valuable asset to the coal geologists. It has enabled them to establish a relationship not only between coal and the plants from which it was formed, but also between the various kinds of coal.

The ratio of the amount of "bright coal" or Anthraxylon" to dull coal or "Attritus" is clearly brought out by the microscope and is a means toward both identification and classification. Cell structure, compactness, etc., can be studied only by the use of such an instrument.

This paper is an attempt to show the importance of the microscope to those who are interested in the correlation and identification of seams, or in studying the kinds of plants from which coal was formed. Sections of certain Alabama coals which contain well preserved materials will be shown. Most of the material used in this paper was obtained from publications of the United States Bureau of Mines which describe the work done by Dr. Reinhardt Thiessen.

EXPLORATION OF AN INDIAN MOUND AND VILLAGE SITE
NEAR BESSEMER, ALABAMA.—David L. DeJarnette, Curator, Alabama Museum of Natural
History.

This paper deals with the excavation of an Indian mound and village site on the property of the Tennessee Coal, Iron and Railroad Company, located one and one-half miles west of the City of Bessemer.

This excavation was begun in the early part of October, 1934, by Dr. Carl E. Guthe, of the University of Michigan, as a field course to accompany his series of lectures on American Archaeology, at Birmingham-Southern College. Upon the completion of Dr. Guthe's course, the Alabama Museum of Natural History continued the field work, utilizing relief labor.

The mound selected for excavation had the appearance of an oval platform with a small mound on the west end. The longer diameter of the base of the platform was about 140 feet, the greatest width 100 feet, and the height about 5 feet. The height of the upper structure, which was on the smaller end of the platform, was 7 feet and the diameter of the flattened top 30 feet. Upon excavation, the base of the mound was found to be several feet below the present surface.

The entire mound was staked off in five-foot squares, in order to facilitate excavation, and to definitely locate material. All objects, such as pottery and artifacts, found in the mound, were located according to their horizontal and vertical position by their square designation and the depth from the surface.

The mound was excavated by employing the vertical slice method. Drawings of these profiles, showing the different soils and strata, were made on coordinate paper.

Photographs were taken of all significant features, including pictures to show progress of the work and method.

SECTION IV

INDUSTRY AND ECONOMICS

THE BEHAVIOR OF PHOSPHATES IN SOILS.

—George D. Scarseth, A. P. I. Experiment Station.

The nature of the phosphate retention by low organic content soils as affected by the iron content, the hydrogen ion concentration as varied with calcium or sodium and the rate of application of the phosphate has been worked out by the use of purified alumino-silicate colloidal systems.

In very acid soils, pH 3.0 to 4.0, the phosphate is retained by the free iron in the soil. At pH 5.0 to 6.0, the phosphate is attached to the surfaces of the clay by the aluminum of the alumino-silicate. At pH 6.0, and above, the sorbed phosphate is brought into solution by OH and silicate anions. Above pH 7.0 the phosphate is converted into tri-calcium phosphates which are insoluble at pH values above 8.0. If sodium instead of calcium ions are present, as in alkali soils, the phosphates will remain soluble as sodium phosphates at pH values above 7.0. Soils very low in active iron do not retain the phosphates in insoluble forms at pH values below 5.0. Changing the reaction of a clay soil that is low in active iron from pH 4.0 to 5.0 or 6.0 may cause a deficiency in the supply of available phosphates to plants. Liming the soil to the extent that the soil contains free CaCO_3 may also cause plant injury because of the precipitation of all the soluble phosphates. Phosphates that are held in soils at pH values between 5.0 and 6.0 can be replaced and brought into solution by other anions as silicates, humates, oxalates, citrates, and hydroxyls. Studies are being made to use blast furnace slag (calcium silicate) for making fixed soil phosphates available to plants and for retarding the fixation of phosphates added in fertilizers to soils.

A STUDY OF REMOVAL OF SULPHUR FROM IRON AND STEEL.

—C. A. Basore and Dan T. Jones, Alabama Polytechnic Institute.

Soda ash cheap though not very effective is normally employed for this purpose.

This paper deals with an alkaline flux whereby the following conditions are secured: (1) A flux of exceptional cheapness is employed. (2) The flux is very fluid at the temperature of the molten iron or steel, (3) Thorough contact is secured and maintained between the molten flux and the molten iron and steel.

When lime (quick lime, low sulphur) was mixed with soda ash or sodium nitrate a cheap flux was secured. A small amount of this flux, very liquid at the temperature employed, was effective in the removal of sulphur. Contact was maintained and secured by means of a steel plunger which forced the flux down through the molten iron or steel. On removal of the plunger the molten flux passed up through the molten metal. This was repeated at intervals of 20 to 30 seconds for a period of about 10 minutes. The molten metal was maintained in a crucible lined with fire clay.

This process was applied on a semi-plant scale to cupola iron, pig iron (both high and low sulphur) and low and medium carbon steel. The reduction of sulphur in the cupola iron and high sulphur pig iron was from 50 to 65 per cent, while in the low sulphur iron it was from 37 to 50 per cent. Results secured on steel showed a reduction from 30 to 50 per cent.

Ordinarily the total flux employed represented only from 1.5 to 2 per cent of the metal by weight. On this basis, the cost of the flux per ton of iron or steel amounts to \$0.15 to \$0.20.

ALLOY STEEL CASTINGS FOR SEVERE TEMPERATURE-STRESS SERVICE.

—Fred B. Riggon, Stockham Pipe Fittings Company, Birmingham.

That significant metallurgical progress has been made recently in steel casting manufacture can be readily seen by reference to the American Society for Testing Materials Tentative Specifications for 1935. Twelve of the fifteen standards covering steel castings have been originated since 1932. Eight of these were added tentatively in 1934.

Consumers are asking for materials for service requirements now which even the new tentative standards will not cover. While work is being carried out on creep at elevated temperatures at many large research laboratories and much cooperative work at the Bureau of Standards and Battelle Memorial Institute, later processes necessitate much additional work at very low temperatures.

In this paper are given data on Izod notched impact tests on low alloy steels at -50° F and -75° F. The author desires to express his appreciation to Messrs. Farrabee and Fringe, of the Metallurgical Department of the University of Alabama, for their assistance and the use of their equipment while making these impact tests at low temperature.

THE STUDY METHODS AND THEIR FUNCTIONS IN INDUSTRY.

—Aubrey H. White, Stockham Pipe Fittings Company, Birmingham.

Time study is an analysis, selection, arrangement, evaluation, and synthesis of a series of movements comprising a given operation. Successful time study must be accompanied by methods study. To determine the most practical equipment and materials, and by motion study to determine the most effective and least fatiguing series of motions to fulfill the process.

Each movement that is made is a series of several fundamental motions. Motion study is a minute and critical scrutiny of the compounding of these elements.

Time study is a mensuration and as such is used by Management in such manner that a builder uses a set of specifications. Time study results are commonly utilized for the payment of extra earnings. Wage payment plans based upon accurate time studies are a source of satisfaction and accord to both Management and Men. Labor costs are inevitably reduced. The workman benefits from increased earnings and is protected by a guaranteed task.

MARRIAGE AND BUSINESS.

—Roland M. Harper, State Geological Survey.

Most people marry sooner or later, but the time for doing so is subject to modification by economic conditions, etc., and the present depression has caused the postponement of many weddings. Some striking correspondences between the marriage and business curves for the United States are shown by graphs, particularly for the year 1933.

RECENT AGRICULTURAL TRENDS IN ALABAMA, AND THE TENANT PROBLEM.

—Roland M. Harper, State Geological Survey.

The 1935 agricultural census shows some interesting changes since 1930 in Alabama, in the number and size of farms, proportion of white and negro farmers, owners and tenants, etc. Much has been written in recent years about the supposedly sad plight of southern tenant farmers, and many schemes for helping them have been proposed. But there are some fundamental differences between farm owners and tenants, that can be changed very little, if at all, by philanthropy or legislation.

THE LUBRICATION OF ANTI-FRICTION BEARINGS.

—W. H. Mandy, The Texas Company.

Anti-friction bearings are designed to develop rolling motion in the interest of reducing friction. Their lubrication is governed by operating conditions; the higher the speeds the lighter the lubricant and the greater the pressures the heavier the lubricant. Bearings operating in the presence of dust and water require grease while those operating under moderate loads in ideal locations can be well lubricated with a medium bodied oil. High external temperatures often require straight mineral cylinder oils or greases made from such oils; and extremely high temperatures necessitate oil circulation systems.

The chief purpose of lubrication in the ball bearing, since no end thrust is present, is to protect its component parts against corrosion and keep out foreign materials. The roller bearing, on the other hand, presents a real task for the lubricant in reducing the ever-present sliding and rolling friction caused by end thrust of the rollers and slippage between the rollers and raceways, therefore, heavier lubricants are necessary to reduce this friction. The degree of end thrust depends upon the difficulty in keeping the rollers in alignment; it usually increases with the load and decreases slightly as the speed increases.

Lubricants for anti-friction bearings should be free from acid-forming tendencies and excess alkali which would destroy the highly polished surfaces; they should not contain fillers, uncombined soap nor graphite which pack between the balls or rollers causing sticking of same. Greases should be stable, nonoxidizing, have low starting and running torques and their consistencies should not vary appreciably with temperature changes.

BOILER WATER CONDITIONING FOR POWER BOILERS.

—John R. Hunt, T. C., I. & R. R. Co.

Although water is our greatest natural resource the mineral salts in many water supplies cause considerable trouble in industrial plants and particularly in boiler operations.

The problems in boiler operation resulting from the impurities are corrosion, foaming and priming, embrittlement and scale formation.

The basic causes of these difficulties are now fairly well understood and by application of proper chemicals with suitable control methods the difficulties can be practically, if not entirely, eliminated.

Sodium carbonate which is generally used for prevention of sulphate type scale is not an effective scale preventative if the feed-water contains silica. Decomposition phenomena prevents sodium carbonate from being an economical treatment for boiler operation at pressures in excess of 200 pounds. Sodium phosphate is advocated for prevention of silica and sulphate type scale at higher pressures.

In conclusion, it is emphasized that good boiler conditions require constant supervision to maintain proper chemical conditions in the boiler water.

A DEVELOPMENT IN FARM DWELLING CONSTRUCTION.

—Fred B. White, T. C., I. & R. R. Co.

The need of fire resisting materials in farm dwellings and buildings made it almost inevitable that a simplified type of construction would be developed in the low cost field.

Sheet steel, due to its fire resisting qualities, has long been a favorite material for industrial buildings. In recent years, however, it has come into wide use in many other fields, and notably in rural districts.

With a view to reducing the cost of fire resisting steel structures, our company has made a considerable study of the methods of applying steel sheets to wood framing, and recently designed and erected in Birmingham a model farm homestead consisting of a 4-room dwelling and several auxiliary farm buildings to demonstrate the practical advantages of this type of construction. The dwelling of this homestead utilizes a wood frame with sheet steel for roof, the outside and inside walls, and ceiling. This type of construction has been termed "Steel Clad" construction.

The cost of an insulated "Steel Clad" house is substantially the same as the cost of ordinary uninsulated frame houses of a similar quality of construction.

Although "Steel Clad" construction is definitely competitive in the low cost field, it is in no respect limited to a definite cost range. It is not necessary to use highly skilled labor in the application of steel sheets in this type construction, and it has been proved that farmers living in remote sections should be able to erect a dwelling of this type with local labor and avoid seeking additional skill elsewhere.

CHAPTER MEMBERS OF THE JUNIOR ACADEMY

Baldwin County High School—(Edward Munn)*	Bay Minette
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Coffee High School	Florence
Convent of Mercy Academy—(Catherine McDonald)*	Mobile
DeKalb County High School—(Walter Raymond)*	Fort Payne
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*Authorized delegates to the fourth annual meeting of the Junior Academy.

PROGRAM OF THE JUNIOR ACADEMY

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<i>Secretary</i> , Eileen Lloyd.....	Convent of Mercy Academy
<i>Treasurer</i> , Sadie Mae Burgess.....	Shades-Cahaba High School

Sessions: Auburn High School
Friday, March 20, 1936

- 1:30 P.M. Registration at Auburn High School and assignment to rooms. Arrangements of exhibits.
- 2:30 P.M. Business Meeting.
- 3:15 P.M. Presentation of Papers.
- 5:00 P.M. Tea Dance, Recreation Hall, Alabama Polytechnic Institute.
- 7:00 P.M. Dinner, entertainment features.
- 9:00 P.M. Dance, Auburn High School.

Saturday, March 21, 1936

- 8:30 A.M. Inspection of the Alabama Polytechnic Institute.
 - 9:00 A.M. Inspection of Exhibits, Auburn High School.
 - 9:30 A.M. Business Meeting.
 - 10:00 A.M. Presentation of Papers. Presentation of Awards.
 - 11:30 A.M. Open Forum. Discussion of High School Science Methods and Teaching.
- Adjournment.

PAPERS PRESENTED

1. Azaleas of Mobile, Catherine Smythe, Bishop Toolen High School.
2. What's New In Television, Alfred Hawkins, Jr., DeKalb County High School.
3. Insects As Spreaders of Disease, Bobbie Ruth Mixon, Hueytown High School.
4. By-products of Coal, Wayne Kiser, Mortimer Jordan High School.
5. Practical Photography, Jack Rambo, Murphy High School.
6. Some Sources of Tannin and Methods of Extraction, Francis Gerhardt, Murphy High School.
7. The Construction and Use of a Home Laboratory, Fred Fitch, Phillips High School.
8. Valence, Harwell Davis, Ramsay Technical High School.
9. Prehistoric Animal Tracks in Alabama, Ruth Miller, Shades-Cahaba High School.
10. Importance of Halogens, Genevieve McClure, Visitation Academy.
11. Our Foods and Drugs, Susie Lively, Woodlawn High School.

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*Charter members of the Alabama Academy of Science. The complete list so far as it is known was published in Volume V of the JOURNAL, p. 8.

†Member A.A.A.S.

‡Honorary Member.

The letters (A), (B), (C), (D), (E), (F), and (G) indicate: (A), Biology; (B), Chemistry; (C), Geology, Anthropology and Archeology; (D), Industry and Economics; (E), Mathematics; (F), Medicine; (G), Physics, as the chief field of interest of the member.

THE NEW YORK ACADEMY OF SCIENCES

77th Street & Central Park West

NEW YORK, N. Y.

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of the

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MARCH, 1937

VOLUME 9

Part I

PROGRAM

of

THE FOURTEENTH ANNUAL MEETING
UNIVERSITY OF ALABAMA
APRIL 2 AND 3, 1937

Office of the Editor

BIRMINGHAM-SOUTHERN COLLEGE

Birmingham, Alabama

ALABAMA ACADEMY OF SCIENCE

Program

Fourteenth Annual Meeting

UNIVERSITY OF ALABAMA

Tuscaloosa, Alabama

April 2 and 3, 1937



Officers

- President*, WALTER B. JONES,
State Geologist of Alabama, University
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- Editor of Journal*, E. V. JONES.....Birmingham-Southern College

GENERAL PROGRAM

All Addresses and Section Meetings are open to the public.

FRIDAY, APRIL 2

- 8:30 A.M. REGISTRATION by all members and guests at entrance of the Chemistry Building. Secure tickets for banquet (Friday, 8 P.M.) and register for Saturday field trips.
- 10:30 A.M. EXECUTIVE COMMITTEE MEETING, Geological Survey Offices, Smith Hall.
- 11:15 A.M. PRELIMINARY BUSINESS MEETING, Room I, Auditorium, Chemistry Building. Appointment of Committees, etc. Adjournment until 5:15 P.M.
- 11:50 A.M. PHOTOGRAPH of the Academy in front of the Chemistry Building.
- 12-1:00 P.M. LUNCHEON (Dutch Luncheon, basement Smith Hall. Price 35 cents).
- 1:30 P.M. SECTION MEETINGS. Papers, discussions, demonstrations, election of section chairmen for 1937-1938. DEMONSTRATIONS will be held in Room 5, Chemistry Building.
- Section I.* Biology and Medical Science, Room I, Auditorium, Chemistry Building. C. M. Farmer, chairman; Alda May Spieth, secretary.
- Section II.* Chemistry, Physics and Mathematics, Room 2, Chemistry Building. H. D. Jones, chairman; Jack Montgomery, secretary.
- Section III.* Geology, Anthropology and Archeology, Room 3, Chemistry Building. J. R. Cudworth, chairman; Edward F. Richards, secretary.
- Section IV.* Industry, Economics and Geography, Room 4, Chemistry Building. Fred B. Riggan, chairman; Aubrey White, secretary.
- 1:30 P.M. ALABAMA JUNIOR ACADEMY OF SCIENCE. Registration at Smith Hall and assignment to rooms. (Due to a misunderstanding the materials for the Junior Academy Program were not received for printing and will be issued in mimeographed form at the registration desk.
- 4:30 P.M. TEA. There will be a tea in the Main Exhibition Hall, Smith Hall. Members of the Academy and Visitors are cordially invited.
- 5:15 P.M. FINAL BUSINESS MEETING, Room 1, Auditorium, Chemistry Building. Reports of committees, election of officers, appointment of standing committees, announcement of Academy grant from A. A. A. S., other business, adjournment.

- 8:00 P.M. ANNUAL BANQUET (informal), Dining Room, Tutwiler Hall, Jack P. Montgomery, Toastmaster. Reservations should be made by mail with David L. DeJarnette, Alabama Museum of Natural History, University of Alabama, University. (\$1.00 per plate.)
- 8:45 P.M. ANNUAL PUBLIC ADDRESSES, Dining Room, Tutwiler Hall.
Address of Welcome: Dr. George Denny, Chancellor, University of Alabama.
Response: Peter A. Brannon, Curator, Department of Archives and History, Montgomery.
Presidential Address: "Conservation of our Natural Resources," Walter B. Jones, State Geologist of Alabama, President of the Academy.
Movie: "Temples and Peace," sound picture of the Moundville culture. 2 reels; 20 minutes. Courtesy of National Park Service. First showing, except preview in Washington, Feb. 23, 1937.

SATURDAY, APRIL 3

- 9-11:00 A.M. GEOLOGICAL AND ARCHEOLOGICAL FIELD TRIP visiting Mound Park, site of the celebrated Moundville culture, Moundville, Alabama; and the famous Havana gullies, carved in variegated clays of the Tuscaloosa formation of Cretaceous Age. The trip will be conducted by Doctor Walter B. Jones, State Geologist, and will require about two hours. Open to all.
- 9:00 A.M. SECTION MEETINGS. Those sections which did not complete their programs on Friday may do so at this time in the same rooms. There will be no meeting of Section III on Saturday.
- 12-1:00 P.M. BARBECUE (Compliments of the University of Alabama)
- 1:00 P.M. TRIPS to Plant of Gulf States Paper Corporation, Bryce Hospital, Veterans Facility, University of Alabama, Mound Park and Botanical trip. Meet in front of Smith Hall.
- 8:15 P.M. PUBLIC LECTURE. DR. EDGAR ALLEN, Yale University. "Internal Secretions and Reproduction." One of a series of lectures being sponsored by the national organization of Sigma Xi Fraternity. Sponsored locally by the Sigma Xi Club through the courtesy of the University of Alabama. Lantern slides and motion pictures. Morgan Hall. Free.

N.B. *Your promptness at all sessions, trips, etc., will be greatly appreciated.*

THE ALABAMA ACADEMY OF SCIENCE: ITS AIMS AND OBJECTIVES

By

WALTER B. JONES*

History. The Academy was organized in April, 1924, and for several years met with the Alabama Educational Association, before holding its own meetings.

Aims. It was thought that the Academy would serve to bring together all those people in Alabama who were either trained or interested in Science. It is certain that there is present to-day that same opportunity for the exchange of ideas, discussions of problems and pleasurable companionship. Often scientists are too prone to work away in their own selected field, thereby losing the enrichment which comes from close contact with their fellows, particularly with those to whom science is a hobby rather than a profession.

Objectives. It occurs to the writer that the field of greatest service open to the Academy is that of the promotion of sound research principles in all branches of science, and the widest possible diffusion of the knowledge thereby gained, among our people. To most scientists the pursuit of knowledge is tantamount to the pursuit of happiness. As scientists, we should mingle freely and easily with those who are interested in, and would like to know more about, scientific subjects. The value of such contacts between scientist and layman cannot be over-estimated. For that reason, widest publicity should be given to the deliberations of the Academy, that the general public may be aware of the progress and trends of science. Almost everyone is interested in some phase of science and the Academy will miss a golden opportunity if that interest is not ascertained and enlarged.

Relationships. In the normal procedure of the work of the Academy, it is evident that a rather complex system of relationships exists between: the Public, Education, and the individual members of the Academy. It is paramount that these relationships be thoroughly recognized and duly appreciated.

In the first place, our idealism dictates that we ever strive constructively, that the world may be a better place in which to live. The scientist and his layman associate form one unit of the army of people who seek to build up and otherwise improve our social, economic and aesthetic environment. It behooves us, therefore, to enlist the aid and interest of the public in our work.

Science is merely one branch of our educational system. Because of the basic and fundamental principles involved, science must carry a large and heavy part of the educational load. Its accomplishments must be carefully fitted into the other cogs of the requirements for an educated citizenship. In that respect, the Academy must reach into the remotest corners of the Commonwealth.

No Academy can be stronger than its membership. The task to be done demands the finest talent to be had, and the closest coordination of effort. As in every other useful walk of life, one gets out of the Academy what one puts into it. Merely to belong is not enough. One must give freely of time and effort, that the results may be fully worthy of the opportunities presented. It is sincerely hoped that each and every member will rise to this noble opportunity for service.

*President, 1936-37.

SECTIONAL PROGRAMS

FRIDAY AFTERNOON—1:30

SECTION I.

BIOLOGY AND MEDICAL SCIENCE

C. M. FARMER, Chairman

Room 1, Auditorium, Chemistry Building

1. EVOLUTIONARY PROBLEMS IN SOME ALABAMA WEEDS. (10 min.)

—Roland M. Harper, Geological Survey of Alabama.

There are many weeds which are commonly supposed to be native but are found only in unnatural habitats that could not have existed as such a few centuries ago; and such species may have originated since the discovery of America. A few specific cases will be discussed.

2. AGRICULTURAL CONDITIONS OF THE GREAT APPALACHIAN VALLEY OF ALABAMA. (15 min.)

—J. Frank Glazner, State Teachers' College, Jacksonville.

This paper is part of a recent regional study of the Great Appalachian Valley of Alabama. It deals with tenancy, land utilization, crops, and conditions of rural life. The data came from the United States Census Reports and from farmers, business men, county officials, and farm agents of the eight counties which lie wholly or in part in the region.

3. AN UNEXPECTED RESULT ON GERMINATION OF *CROTALARIA SPECTABILIS* FROM LONG DRYING IN THE SOIL. (15 min.)

—J. F. Duggar, Alabama Polytechnic Institute.

4. DIFFERENTIAL COUNTS OF THE ISLET CELLS OF THE DOG PANCREAS. (10 min.) (Lantern.)

—Thomas E. Hunt, Department of Anatomy, University of Alabama.

Differential counts of the alpha, beta and delta cells of four dog pancreases have been made, the respective average percentages being approximately 20, 75 and 5. The tissues from which the counts were made were taken from various regions of the tail, body, head and vertical process.

5. RECIPROCAL TRANSLOCATIONS OF THE II AND III CHROMOSOMES IN THE SOMATIC AND MEIOTIC DIVISIONS OF *DROSOPHILA MELANOGASTER*. (15 min.)

—Dale C. Braungart, Department of Biology, University of Alabama.

By x-raying reciprocal translocations between the second and third chromosomes were secured. The phenomenon of somatic pairing parallels that seen in *Oenothera* by Cleland. A description of pairing in the testes strengthens the theory of Belling. Circle formation was seen to take place between the second and third chromosomes during the metaphase of the first meiotic division.

6. AN INEXPENSIVE MICROSCOPE LAMP FOR CRITICAL ILLUMINATION. (5 min.) (Lantern.)
—J. Gordon Carlson, Department of Zoology, University of Alabama.
A microscope lamp of adjustable intensity can be constructed of parts costing five or six dollars and will give critical illumination of a quality comparable to that of lamps on the market priced several times higher. (Such a lamp will be on demonstration.)
7. STUDIES ON THE SOMATIC MITOTIC CYCLE IN THE GRASSHOPPER. (10 min.) (Lantern.)
—J. Gordon Carlson, Department of Zoology, University of Alabama.
Unequal division of neuroblasts in grasshopper embryos, to give rise to ganglion cells, is accompanied by nuclear and chromosomal changes that have a bearing on a number of problems of cytology, viz., those involving karyomeres, somatic pairing, multiple chromosomes, chromosomal constrictions, chromomere vesicles, heteropycnosis, and chromatid separation at anaphase.
8. SPECIFIC FUNCTIONS OF AFFERENT FIBERS AS SHOWN IN EXPERIMENTS WITH THE CATHODE RAY OSCILLOGRAPH. (10 min.)
—A. Sidney Harris, Department of Physiology and Pharmacology, University of Alabama.
Evidences from both mamalian and amphibian experiments will be presented to show that afferent nerve fibers are specific in the reflex function that they serve, i. e. that a given afferent fiber can evoke only one pattern of reflex response. Methods of recognition of the fibers serving certain functions will be discussed.
9. THE BIRDS OF CUBA. (10 min.) (Lantern.)
—P. H. Yancey, Spring Hill College.
Besides many northern birds which only winter in Cuba, the island has as permanent residents representatives of eighteen orders distributed in thirty-five families. The ornithological sources of the island and the principal types of birds are discussed.
- *10. ALABAMA DRAGONFLIES (ODONATA). (10 min.) (Lantern.)
—Septima Smith and Robert S. Hodges, Department of Zoology, University of Alabama.
Two seasons' collecting in ten Alabama counties have afforded 94 species of dragonflies, 67 Anisoptera and 27 Zygoptera, which, perhaps, represent 75% of the total number to be found in the state. The relative abundance of the different species and their distribution in relation to other sections of North America are discussed.
11. A SURVEY OF INTESTINAL PROTOZOA IN AN ALABAMA ORPHANAGE. (10 min.)
—James Holt Starling, Troy High School, Troy, Alabama.

*Aided by the Academy Grant of the A. A. A. S.

READ BY TITLE

SCHOOL HEALTH WORK IN PIKE COUNTY.

—W. H. Abernethy, Pike County Health Office.
—(Also by demonstration.)

BY DEMONSTRATION

1. SCHOOL HEALTH WORK IN PIKE COUNTY. (Also by title.)
—W. H. Abernethy, Pike County Health Office.
2. STEREOSCOPIC ILLUSTRATIONS. Demonstration of the Method of F. C. Sauer, late Assistant Professor of Zoology, University of Wichita.
—Mary Elmore Sauer, Department of Anatomy, University of Alabama.
An original and simple mechanical procedure is employed to produce a perspective picture of an object from measurements in three dimensions of points in the object. A stereoscopic mate for this drawing is readily constructed by the use of a simply ruled transparent sheet which gives directly the new location for each point.
3. TRANSVERSE SECTIONS OF THE CERVICAL SYMPATHETIC TRUNK AND GREATER SPLANCHNIC NERVE OF THE CAT PREPARED AFTER ELIMINATION OF PREGANGLIONIC EFFERENT NEURONES.
—James O. Foley, Department of Anatomy, University of Alabama.
4. TRANSVERSE SECTIONS OF THE FACIAL NERVE OF THE CAT PREPARED AFTER ELIMINATION OF MOTOR FIBERS.
—Franklin S. DuBois, Department of Anatomy, University of Alabama.
5. THE ALPHA, BETA AND DELTA CELLS OF THE ISLETS OF THE DOG PANCREAS.
—Thomas E. Hunt, Department of Anatomy, University of Alabama.

FRIDAY AFTERNOON—1:30

SECTION II.

CHEMISTRY, PHYSICS AND MATHEMATICS

JACK MONTGOMERY, Acting-Chairman

Room 2, Chemistry Building

1. LINEAR HOMOGENEOUS DIFFERENTIAL EQUATIONS WITH CONSTANT COEFFICIENTS. (15 min.) (Demonstration.)
—George Wilbur Campbell, Department of Mathematics, University of Alabama.

This paper deals with the recent treatment of linear homogeneous differential equations with constant coefficients developed by Bartky, Barnard, and others. This treatment is characterized by the use of the vector and matrix notation which greatly simplifies the problem of obtaining a fundamental set of solutions.

2. A NEW METHOD OF DETERMINING THE FUNDAMENTAL UNIT OF A REAL QUADRATIC FIELD. (15 min.)
—Paul M. Hummel, Department of Mathematics, University of Alabama
Every real quadratic field has infinitely many units. One of these, called the fundamental unit, has the property that every other unit may be expressed as plus or minus some power (positive, negative, or zero) of it. This paper describes a method of determining the fundamental unit which is entirely free of tentative procedure.
4. A PROBABILITY TEST OF RANDOM COUNTS FROM GEIGER-MULLER COUNTERS. (15 min.) (Lantern.)
—Eric Rodgers, Department of Physics, University of Alabama.
5. SOME CONFORMAL MAPPING IN CONNECTION WITH THE TRANSFORMATION $W = \cot Z$. (15 min.)
—Jane Lee Evans, Department of Mathematics, University of Alabama.
The paper deals with the geometry obtained by mapping parameter lines $x = a$, $y = b$ upon the w -plane by means of the transformation $w = \cot z$.
6. THE ENVELOPE OF THE SYSTEM OF CIRCLES WHICH ARISE BY INVERTING IN THE UNIT CIRCLE THE LINES OF A FIXED CONIC. (15 min.) (Demonstration.)
—Emerson Blakney, Department of Mathematics, University of Alabama.
This problem is compared with a similar problem appearing recently in the *American Mathematical Monthly* and a new method is employed in its solution.
7. PEDAL CURVES. (10 min.) (Demonstration.)
—Aaron Abston, Department of Mathematics, University of Alabama.
This paper deals with a general method of finding pedal curves and with transformations of such curves. In addition a general method of writing the negative pedal of a given pedal curve is discussed. The work is amply illustrated with examples.
8. ABSOLUTE UNIT FOR LENGTH IN HYPERBOLIC GEOMETRY. (5 min.)

—Henry Gerhardt, Mobile.

It is known that in hyperbolic geometry a certain part of a horocycle can be chosen as an absolute unit for length, but the proof of this is circumstantial and unnatural. This paper gives an elementary and more natural proof based on the conformal representation of hyperbolic geometry.

FRIDAY AFTERNOON—1:30

SECTION III.

GEOLOGY, ANTHROPOLOGY AND ARCHEOLOGY

J. R. CUDWORTH, Chairman

Room 3, Chemistry Building

1. NEGLECTED FACTORS IN THE STUDY OF ANCIENT SEDIMENTS. (10 min.)

—R. S. Poor, Birmingham-Southern College.

The paper deals with two groups of factors often neglected or undervalued in the study of ancient sediments. (1) Physical factors such as paleogeology in contrast with paleogeography; the sources of sediment; the mineralogy of sedimentary rocks etc., and (2) Organic factors such as a more thorough study of planktonic forms, of temperature control on organisms, influence of sea floor conditions, habits of animals and plants, etc.

2. THE IMPORTANCE OF REFLECTION WAVES IN SEISMOLOGY AND GEOLOGY. (10 min.) (Lantern.)

—A. J. Westland, Department of Geophysics, St. Louis University.

A discussion of various uses of reflection waves by the seismologist, the geologist, and the geophysicist in the study of the earth's crust.

3. GEOLOGY OF HOG MOUNTAIN ALABAMA DISTRICT. (10 min.) (Lantern.)

—N. O. Johnson, Alexander City.

4. STUDIES OF THIN SECTIONS OF THE BLUE CREEK COAL SEAM. (10 min.) (Lantern.)

—C. S. Blair, Black Diamond Coal Mining Company, Birmingham.

5. IRON ORES AVAILABLE TO ALABAMA BLAST FURNACES. (10 min.) (Lantern.)

—Ernest F. Burchard, United States Geological Survey, Washington D. C.

6. MOVING PICTURES: PICKWICK BASIN EXCAVATIONS. (10 min.)

—David L. DeJarnette, Alabama Museum of Natural History, University.

7. A SHORT HISTORY OF ZEUGLONDON. (10 min.)

—E. F. Richards, Department of Geology, University of Alabama.

8. HOLOTHURIAN REMAINS FROM THE MIDWAY OF ALABAMA. (10 min.) (Lantern.)

—Winnic McGlamery, Geological Survey of Alabama, University.

Three localities are given where Holothurian fragments in the form of microscopic spicules and plates, which may be near the genus *synapta*, have been found.

9. LONGEVITY IN THE TENNESSEE VALLEY. (10 min.)
 —Roland M. Harper, Geological Survey of Alabama, University.
 Statistics of cemeteries, and of current death records, show that people live longer now than formerly, but there are some interesting variations in different parts of the valley, which may be correlated in part with geological formations.
10. A REPORT ON THE GEOLOGY OF CHEHAW STATE PARK, G. SP-9 AND VICINITY. (10 min.)
 —Robert Harrell Griffin, Department of Geology, University of Alabama.
 This report is a discussion of the areal geology of an area immediately north of the city of Albany in South East Georgia. The area studied lies within the coastal plain province of Georgia.
11. PETROLEUM POSSIBILITIES IN ALABAMA. (10 min.) (Lantern.)
 —Joseph J. Graham, Department of Geology, University of Alabama.
 The potentially petroliferous areas of Alabama are discussed with special emphasis upon the significance of recent geophysical exploration work and drilling operations in the Gulf Coast Province.
12. BIRD CONCEPTS AMONG THE TALLAPOOSAS. (10 min. (Lantern.)
 —Peter A. Brannon, Alabama Department of Archives and History, Montgomery.
 A discussion and re-interpretation of some designs and figures of the middle Alabama Indians.
13. GLASS. (10 min.) (Lantern.)
 —T. N. McVay, School of Chemistry, Metallurgy and Ceramics, University of Alabama.
 A presentation of the chemistry and physics of natural and synthetic glasses.
14. PRESENT STATUS OF GEMOLOGY. (10 min.) (Dichroscope and Ultra-Violet Lamps.)
 —Arthur A. English, Mobile.

SATURDAY MORNING—9:00

SECTION I.

BIOLOGY AND MEDICAL SCIENCE

C. M. FARMER, Chairman

Room 1, Auditorium, Chemistry Building

1. A PHYSIOLOGICAL STUDY OF PLATELETS, MEGAKARYOCYTES AND THROMBOCYTES. (20 min.) (Lantern.)
—John H. Ferguson, Department of Physiology and Pharmacology, University of Alabama.

Mammalian platelets are essential factors in coagulation of blood by means of a peculiar type of osmotic imbibition and partial plasmolysis. Bone-marrow giant cells, embryonic nucleated blood cells of the rabbit, and thrombocytes of frog, sunfish, turtle, and fowl evince a lability to the specific lytic factors cited, quantitatively different from the lysis of other cellular and tissue elements.

2. THE JUGULAR FIBERS IN THE VAGUS NERVE OF THE CAT. (10 min.) (Lantern.)
—Franklin S. DuBois, Department of Anatomy, University of Alabama.

Studies made by the chromatolytic and degeneration methods suggest that relatively few of the sensory fibers with cell bodies in the jugular ganglion descend in the cervical trunk of the vagus nerve.

3. THE VAGUS NERVE DISTAL TO THE NODOSE GANGLION OF THE CAT. (15 min.)
—James O. Foley, Department of Anatomy, University of Alabama.

Sections of the vagus nerve distal to the nodose ganglion prepared by various silver techniques demonstrate fine black dots which, because of their arrangement and distribution, are thought to be branches of axons. If this interpretation is correct, the number of fibers distal to the nodose ganglion exceeds that proximal by a far greater margin than has hitherto been suggested or anticipated.

4. A METHOD FOR THE RAPID DETERMINATION OF ENTEROTOXIC STRAINS OF STAPHYLOCOCCI IN FOOD POISONING OUTBREAKS. (10 min.)
—Ralph McBurney and Louise Cason, Department of Bacteriology and Hygiene, University of Alabama.

Bacterial free filtrates of staphylococci isolated from food poisoning outbreaks that were non-toxic to experimental animals when grown in nutrient broth; either under ordinary oxygen or 30% CO₂ tension, proved toxic when grown in a modified custard medium.

Comparison of twenty-five different strains on a nutrient milk agar with reactions on Stone's medium gave parallel results.

Simplicity in composition, rapidity in identification, accurate isolation of enterotoxic strains, and maximum enterotoxin production are outstanding factors.

5. A NEW AND UNIVERSAL CULTURAL MEDIUM FOR DIFFERENTIATING HAEMOPHILIC ORGANISMS. (10 min.)
—Ralph McBurney and Louise Cason, Department of Bacteriology and Hygiene, University of Alabama.

Because of the selectiveness of the pneumococci for the spleen in the laboratory mouse test for pneumococci, special splenic infusion and splenic hormone media have been investigated. The hemophilic organisms require frequent transfers for longevity and because of their fastidiousness for blood or blood serum in cultural media, defibrinated blood has been added to this splenic agar.

Definite increase in length of life of the organisms and luxuriousness of growth has been demonstrated.

6. TRENDS IN MEDICAL EDUCATION. (15 min.)
—Stuart Graves, Dean School of Medicine, University of Alabama.

Recent trends in medical education. Pressure by rating authorities for higher qualitative scholastic standards of admission. Ethical fitness and responsibility to society. What the Alabama School of Medicine is doing to meet these standards. Progress of medical education in Alabama.

7. THE CATHODE RAY OSCILLOGRAPH AND THYRATRON OSCILLATOR APPLIED TO THE STUDY OF NERVE ACTION. Demonstration. (Continuous 9-12, Physiological Laboratory, second floor, School of Medicine.)
—A. Sidney Harris, University of Alabama.

Nerve action potentials, and their specific alterations by the excitation of different nerve fiber groups will be demonstrated. The thyatron oscillator will be used in the demonstration and some of its features as a multi-purpose physiological stimulator will be shown and discussed.

8. A SYSTEM FOR FILING MONOGRAPHS, PAMPHLETS AND REPRINTS. Demonstration. (Continuous 9-12, second floor, School of Medicine.)
—Emmett B. Carmichael, University of Alabama.

SATURDAY MORNING—9:00

SECTION II

CHEMISTRY, PHYSICS AND MATHEMATICS

JACK MONTGOMERY, Acting-Chairman

Room 2, Chemistry Building

1. THE ELECTROLYTIC REDUCTION OF ANTHRANILIC ACID TO 2-AMINOBENZYL ALCOHOL. (15 min.)
—Roger W. Allen and Homer Carlovitz, Alabama Polytechnic Institute, Auburn.

2-Aminobenzyl alcohol, m. 83.5°C., is obtained in good yield by the electrolytic reduction of an acidified solution of anthranilic acid, m. 145°C. A lead cathode is employed. The procedure, a description of the set-up and optimum conditions of current density, temperature and time are given.

2. THE VITAMIN B AND VITAMIN C CONTENT OF THE ACORNS OF QUERCUS NIGRA. (10 min.) (Lantern.)

—Anna E. Church, School of Chemistry, Metallurgy and Ceramics, University of Alabama.

The vitamin B content of the acorns of *Quercus nigra* has been determined biologically and the vitamin C content, biologically and by a modification of the titration procedure of Bessey and King. On the dry basis the vitamin B content of the acorn kernels is 6 Sherman units per gram, and there is present between 0.6 and 0.7 mg. ascorbic acid per gram.

3. A NEW METHOD FOR THE HARD SURFACING OF STEEL, i.e. HARD SURFACING OF STEEL BY A DIPPING PROCESS.

—C. A. Basore and Dan T. Jones, Auburn.

A dipping process has been developed whereby steel articles have been successfully hard surfaced by dipping in a molten alloy steel. The thickness of coating can be varied at will. Articles surfaced in this way give three to five times the service of unsurfaced articles. Process has been carried out on both a laboratory and a semi-plant scale. The cost of hard surfacing by this method may not be more than 10 per cent of that by the old process employing a rod.

4. THE COMPOSITION OF A NEW SERIES OF SULFUR DYES. (10 min.)

—G. D. Palmer and S. J. Lloyd, School of Chemistry, Metallurgy and Ceramics, University of Alabama.

Preparation of a new series of sulfur dyes by contact of molten sulfur with the vapors of organic compounds has been previously reported. (J. A. C. S. 52 3388 (1930)) These substances have been purified by extraction with representative solvents and analyzed for carbon, hydrogen and sulfur. A constancy in empirical formulas has been obtained.

5. TWENTIETH CENTURY PHLOGISTIANS. (15 min.)

—Jack P. Montgomery, University of Alabama.

The Phlogiston Theory was of great value in the 18th Century. Important contributions to chemistry were made by the disciples of the theory. This theory passed away very largely as the result of discoveries made by the phlogisticians themselves. Some modern theories are considered as somewhat parallel.

6. TORNADOES, WITH PARTICULAR REFERENCE TO SUCH DISTURBANCES OCCURRING IN ALABAMA.

—Patrick H. Smyth, formerly Meteorologist U. S. Weather Bureau Retired, Montgomery, Ala.

Their frequency, meteorological conditions favorable for their origin and development; destructive vorticular whirling, low pressure within the vortex, attendant funnel-shaped cloud; progression, time of occurrence, incredulous freaks.

7. DERIVATIVES OF 6-AMINOQUINOLINE. (10 min.)

—George W. Hargreaves and O. Bostick, Alabama Polytechnic Institute, Auburn.

The preparation of 6-nitroquinoline and its reduction to 6-aminoquinoline are described. The oxidation and diazotization of 6-aminoquinoline are discussed. Compounds formed by the coupling of the diazo compound with betanaphthol, 6-hydroxyquinoline and o- and p-toluidine are described.

8. A STUDY OF NICKEL CATALYSTS.—II.

—Kenneth Coons, University of Alabama.

The role of activating agents in catalyst preparation was studied by means of examination of the crystal lattice structure with the power x-ray apparatus. The particle size of active catalysts is such as to preclude accurate determinations by this means.

9. THE HYDROLYSIS OF LIGNIN.

—Kenneth Coons, University of Alabama.

Treatment of precipitated lignin at near the critical temperature of water without a catalyst leads to the formation of oils which may be fractionated by selective solvation and precipitation. The physical characteristics of these oils are discussed in this paper.

SATURDAY MORNING—9:00

SECTION IV.

INDUSTRY, ECONOMICS AND GEOGRAPHY

FRED B. RIGGAN, Chairman

Room 4, Chemistry Building

1. WEATHER—SOME OF ITS ECONOMIC AND AGRICULTURAL ASPECTS. (15 min.)

—Edgar C. Horton.

2. MOBILE: A STUDY IN URBANISTICS. (15 min.) (Lantern.)

—Floyd F. Cunningham, State Teachers College, Florence.

3. WHAT DO THE INDUSTRIES EXPECT OF THE COLLEGES? (15 min.)

—John Xan, Howard College.

The information was gathered by interviewing executives of industrial concerns in the Birmingham district. They desire a college graduate who is outstanding in college activities, as well as in scholarship; possessing certain attitudes regarding honesty, humility and good-will. In addition to his technical ability, will he ultimately make a good executive?

4. EXPERIMENTS ON THE RAPID REDUCTION OF POWDERED IRON ORE TO A MOLTEN PRODUCT.

—Ray L. Farabee and Elwyn Archibald, University of Alabama.

This process consists of blowing finely divided ore or ore concentrates, along with a predetermined quantity of powdered coal to act as a reducing agent and powdered lime to serve as a flux, into a furnace with a strongly reducing atmosphere,—the operation being similar to firing powdered coal.

5. SOME OBSERVATIONS ON THE SHRINKAGE IN CUPOLA MALLEABLE IRON.

—Fred B. Riggan and Ray F. Frings, Stockham Pipe Fittings Co., Birmingham.

A study of the formation of porous areas during solidification of cupola malleable iron. The mechanics involved in the formation of internal voids are considered. The effects of varying carbon and silicon contents on shrinkage are given together with data on the freezing range of malleable iron.

6. SOME SUGGESTIONS ON VOCATIONAL GUIDANCE. (15 min.)
—S. D. Moxley, American Cast Iron Pipe Co., Birmingham.
This paper deals with an attempt to record and segregate into definable terms some of the characteristics, likes and dislikes, trends and talents, that indicate in broad terms the fields of work for which one might be best fitted.
7. KEEPING MEN ON THE JOB. (15 min.)
—Dr. Percy H. Woodall, Birmingham.
A discussion of non-confining treatment of certain groups of diseases that were formerly hospitalized thus saving industry and the man this loss of time.
8. EMPLOYMENT AND PERSONNEL ADMINISTRATION IN THE FIELD OF INDUSTRIAL RELATIONS. (15 min.)
—J. P. McClendon, Stockham Pipe Fittings Co., Birmingham.
A discussion of the methods and the importance of the work of Personnel Administration.
9. ALABAMA'S WET AND DRY COUNTIES COMPARED. (15 min.) (Tables and graphs.)
—Roland M. Harper, Geological Survey of Alabama, University.
The population of the counties that returned a majority against prohibition in recent elections differs in several important particulars from that of those favoring prohibition; but cause and effect are not clearly distinguished. Illustrated by tables and graphs.
10. THE GEOGRAPHICAL PHASE OF THE COKE BUSINESS. (15 min.)
—Carson Adams, Adams-Rowe and Norman Coal and Coke Co., Birmingham.
11. AIR MASSES IN ALABAMA, JANUARY, 1937.
—J. Allen Tower, Birmingham-Southern College.
An application of the recent air mass analysis technique to Alabama weather.

BY DEMONSTRATION

1. A GRAPHIC SUMMARY OF ALABAMA HISTORY SINCE 1820. (An exhibit.)
—Roland M. Harper, Geological Survey of Alabama, University.



THE JOURNAL
of the
ALABAMA ACADEMY
OF SCIENCE

(Affiliated with A. A. A. S.)

MAY, 1937

VOLUME 9
PART 2

PROCEEDINGS AND ABSTRACTS
of
THE FOURTEENTH ANNUAL MEETING
UNIVERSITY OF ALABAMA
APRIL 2 AND 3, 1937

Office of the Editor
BIRMINGHAM-SOUTHERN COLLEGE
Birmingham, Alabama

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ALABAMA ACADEMY OF SCIENCE

MAY, 1937

OFFICERS FOR 1937-1938

President, ROGER W. ALLEN.....Alabama Polytechnic Institute, Auburn, Ala.

President-Elect, P. H. YANCEY.....Spring Hill College, Mobile, Ala.

Vice-Presidents and Section Chairmen:

J. GORDON CARLSON.....Biology and Medical Sciences, University, Ala.

G. W. HARGREAVES, Chemistry, Physics and Mathematics,
.....Alabama Polytechnic Institute, Auburn, Ala.

PETER A. BRANNON, Geology, Anthropology and Archeology,.....
.....Department of Archives and History, Montgomery, Ala.

JOHN XAN, Industry, Economics and Geography,.....
.....Howard College, Birmingham, Ala.

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Editor of the Journal, E. V. JONES.....Birmingham-Southern College, Ala.

PAST PRESIDENTS

WRIGHT A. GARDNER (2 terms).....Auburn.....1924-1926

STEWART J. LLOYD.....University.....1926-1927

JOHN R. SAMPEY.....Howard College.....1927-1928

WALTER C. JONES.....Birmingham.....1928-1929

FRED ALLISON.....Auburn.....1929-1930

EMMETT B. CARMICHAEL.....University.....1930-1931

GEORGE J. FERTIG.....Birmingham.....1931-1932

J. F. DUGGAR.....Auburn.....1932-1933

J. L. BRAKEFIELD.....Howard College.....1933-1934

R. S. POOR.....Birmingham-Southern College.....1934-1935

A. G. OVERTON.....Alabama By-Products Corp.....1935-1936

WALTER E. JONES.....University.....1936-1937

GENERAL PROGRAM
Fourteenth Annual Meeting
University, April 2-3, 1937

FRIDAY, APRIL 2

- 8:30 A.M. *Registration* at entrance of Chemistry Building. Secure banquet tickets and register for trips.
- 10:30 A.M. Executive Committee Meeting, Smith Hall.
- 11:15 A.M. Preliminary Business Meeting, Auditorium, Chemistry Building.
- 12-1:00 P.M. *Luncheon*, basement Smith Hall. Price 35c.
- 1:30 P.M. Section Meetings; Papers, discussions, demonstrations, election of section chairmen for 1937-1938.
 Demonstrations in room 5, Chemistry Building.
- 1:30 P.M. Alabama Junior Academy of Science. Registration at Smith Hall and room assignments.
- 4:30 P.M. Tea in Smith Hall.
- 5:15 P.M. Final Business Session, Auditorium, Chemistry Building.
- 8:00 P.M. *Annual Banquet* (informal) Tutwiler Hall Price \$1.00.
- 8:45 P.M. Annual Public Addresses, Tutwiler Hall.
Address of Welcome: Dr. George Denny, Chancellor, University of Alabama.
Response: Peter A. Brannon, Curator, Department of Archives and History, Montgomery.
Presidential Address: "Conservation of Our Natural Resources", Walter B. Jones, State Geologist of Alabama, President of the Academy.
Movie: "Temples and Peace". A sound picture of the Moundville Culture.

SATURDAY, APRIL 3

- 9-11:00 A.M. Geological and Archeological Field Trip to Mound Park and Havana gullies, conducted by Walter B. Jones.
- 9:00 A.M. Section meetings.
- 12-1:00 P.M. Barbecue, compliments of University of Alabama.
- 2:00 P.M. Trips to Gulf States Paper, Bryce Hospital, Veterans Facility, University of Alabama, Mound Park and Botanical trip. Start from Smith Hall.
- 8:15 P.M. Public Lecture: "Internal Secretions and Reproduction" by Dr. Edgar Allen, Yale University. sponsored by Sigma Xi Club of University of Alabama. Morgan Hall. Free.

MINUTES OF THE MEETING OF THE EXECUTIVE COMMITTEE, APRIL 2, 1937

The meeting was called to order at 10:30 A.M. in the Geological Survey offices at Smith Hall by Walter B. Jones, President of the Academy.

1. *Minutes*: The minutes of the previous meeting of the Executive Committee held at Alabama Polytechnic Institute, March 20, 1936, were read by the secretary. They were approved as read.

2. *Eligibility for Presentation of Papers*: C. M. Farmer moved that the policy of allowing members in arrears to pay dues for two years, that is, for the preceding and the current year, as outlined in a letter compiled by the president and the secretary and sent to section chairmen during the year, be approved. The motion was seconded by E. V. Jones. Carried.

3. *The Journal*. The time and expense of the publication of the Journal, with reference to the meeting, brought forth its annual discussion. Dr. Walter B. Jones emphasized the burden of sponsoring the Academy meeting and expressed a hope that the income of the Academy can be raised by next year. The Editor emphasized the value of the current policy of publishing part I of the Journal with titles and a fifty word explanation of each title in advance of the meeting. It was approved. Dr. Brakefield moved that the two hundred and fifty word abstract to be published in part II of the Journal after the meeting be handed to the Section Chairmen at the time of presentation of the individual papers. This was seconded by Dr. Carmichael. Passed. Dr. Carmichael moved that the previous plan of publishing the two hundred and fifty word abstract in advance of the meeting be abandoned. Dr. Duggar offered a substitute motion to correlate this scheme of publication in accordance with the Florence plan. Passed. Dr. Carmichael moved that the Editor's new plan of publishing the fifty word general statement along with the title be adopted. Seconded by Fred B. Riggan. Passed.

4. *New Members*. About twenty-five new members were added to the Academy this year previous to the meeting and six reinstatements, that is, those eligible on the basis of payment of current and one year's previous dues.

5. *Report of the Committee on the Academy Award*. E. V. Jones, Chairman, announced that the award was given to Dr. Septima Smith for the year 1937-38. He suggested that from now on a suitable application form, which could be torn out and sent in to the proper authorities in advance of future meetings, be printed in the Journal. Thus, all academy members would be made cognizant of the possibility of applying for the same.

6. *Honorary Member*. Dr. Carmichael moved, seconded by Dr. Duggar, that Dr. Edgar Allen, the Academy lecturer for Saturday evening, sponsored by the local Sigma Xi Club and sent out by the National Sigma Xi Scientific fraternity be elected an honorary member of the Alabama Academy of Science. Passed in Executive Meeting. To be brought up for approval at General Meeting.

7. *Instructions to Division Chairmen*. Dr. Walter B. Jones emphasized to the section chairmen the necessity of carrying through the various programs, according to schedule and of requesting the abstracts which are to be turned over to the Editor at the end of the meeting.

MINUTES OF THE PRELIMINARY BUSINESS MEETING

The meeting was called to order by Dr. Walter B. Jones, president of the Academy, at 11:15 A.M., April 2, in the auditorium of the Chemistry Building. The minutes of the previous preliminary Business Meeting were read and approved.

Reports of the Standing Committees:

1. *Committee on Incorporation*. A. G. Overton, Chairman, and committee again recommended the inadvisability of incorporating at this time. It was moved by P. H. Yancey and seconded by B. F. Clark that this report be adopted. Carried.

2. *Report of the Councilor of the A.A.A.S.*, P. H. Yancey. Report made. Acceptance moved by E. V. Jones, seconded by E. B. Carmichael. Carried (report appended).

3. *Report of the Editor of the Journal*. Report made. Acceptance moved by E. B. Carmichael, seconded by C. M. Farmer. Carried (report appended).

The following committees were appointed and instructed to report at the final business session at 5:15 P.M.

1. *Auditing Committee*: (a) for the Senior Academy: E. B. Carmichael, chairman, J. H. Coulliette, Peter A. Brannon. (b) for the Junior Academy: C. A. Basore, Chairman, E. C. Horton, P. H. Smyth.

2. *Resolutions Committee*: R. S. Poor, Chairman; P. H. Yancey, J. Gordon Carlson.

3. *Committee on Place of 1938 Meeting*: J. L. Brakefield, Chairman; C. M. Farmer, J. F. Duggar, George J. Fertig.

4. *Nominating Committee*: S. J. Lloyd, Chairman; J. L. Brakefield, R. W. Allen.

This committee was admonished to nominate the following officers: (a) President-elect, (b) Secretary, (c) Councilor, the secretary to be elected for a period of three years.

The Vice-Presidents of each section are elected at the section meetings by the members thereof. Each Section Chairman appoints his own Secretary.

5. *Report of the Treasurer*: Treasurer's report was read and referred to the auditing committee.

6. It was moved by J. L. Brakefield, seconded by T. N. McVay, that the reports of (a) the Representative at the second Atlanta meeting of the proposed Southeastern division of the A.A.A.S., (b) Resolutions Committee, (c) of the Acting Editor of the Journal, be adopted without a reading. Carried.

7. *Honorary Member*: The recommendation of the Executive Committee that Edgar A. Allen be elected an honorary member was presented to the Academy. It was moved by P. H. Yancey, seconded by E. V. Jones. Carried. Dr. Allen is the second man to be elected an honorary member of the Academy.

Following announcements regarding the Dutch luncheon, banquet, barbecue, field trips, and Dr. Allen's lecture, the meeting adjourned.

Following adjournment, a photograph of the Academy was made by David L. DeJarnette, Curator of the Alabama Museum of Natural History.

MINUTES OF THE FINAL BUSINESS MEETING

The second session was called to order 5:15 P.M. by President Jones. The minutes of the previous final business session were read by the Secretary. Their approval was moved by R. S. Poor and seconded by P. H. Yancey. Carried.

Dr. Jones expressed his appreciation to the executive officers of the University of Alabama and to all who aided in the preparations for holding the Academy meeting on the University Campus this year.

Committee reports.

1. *Report of the Committee on the Academy Award*: E. V. Jones, Chairman, announced that the award was again given to Dr. Septima Smith, Zoology Department of the University of Alabama. He recommended that a committee for the award for next year be appointed at an early date.

P. H. Yancey, councilor of the A.A.A.S., gave the basis for the grant to the Academy.

2. *Reinstatement of Members*: The reinstatement of members in arrears on the basis favored by the Executive Council at the morning session (i.e., payment of current dues and for last year) was presented to the Academy. Approval moved by J. F. Duggar, seconded by E. V. Jones. Carried.

3. *Report of the Auditing Committee for the Senior Academy*: The committee examined and approved report of the Treasurer, B. F. Clark. It was moved by G. F. Barnes, seconded by R. S. Poor that the report be accepted. Carried. (Report appended.)

4. *Report of the Auditing Committee for the Junior Academy*: The President announced that this report would be given by mail.

5. *Report of the Resolutions Committee*: R. S. Poor read the resolutions. It was moved by R. W. Allen, seconded by C. A. Basore, that the report be accepted. Carried. (Appended.)

6. *Report of Committee on Place of Meeting*: Dr. Brakefield, Chairman of Committee, announced that the invitation received from C. M. Farmer to hold the 1938 meeting in Troy was so urgent that it could not be turned down. Moved by P. H. Yancey, seconded by E. B. Carmichael, that the invitation be accepted. Carried.

The date of the next meeting was left to the judgment of the new administration.

7. *In Memoriam*: P. H. Yancey read a resolution in memoriam for Father Bede Knapke of St. Bernard College, Cullman, Alabama, who had passed away since the last meeting.

8. *Report of Elections of Chairmen of Sections*:

Section I. Biology and Medical Sciences:

Dr. J. Gordon Carlson, University of Alabama

Section II. Chemistry, Physics and Mathematics:

George W. Hargreaves, Alabama Polytechnic Institute, Auburn

Section III. Geology, Anthropology and Archeology:

Peter A. Brannon, Curator, Department of Archives and History, Montgomery

Section IV. Industry, Economics and Geography:

John Xan, Howard College, Birmingham

9. *Report of the Committee for Nomination of Officers for 1938*:

President-elect: P. H. Yancey, Spring Hill College, Mobile

Secretary: Dr. Septima Smith, University of Alabama. (Reelected for three years)

Councilor of the A.A.A.S.: Paul Bales, Howard College, Birmingham
Dr. S. J. Lloyd, Chairman, moved the acceptance of this report. Carried.

Unexpired terms: Treasurer: Dr. B. F. Clark, Birmingham-Southern College (1 year)

Editor of the Journal: Dr. E. V. Jones, Birmingham-Southern College (2 years)

Dr. E. B. Carmichael moved and it was voted that the correspondence of all past officers and other literature relating to the Academy be collected as part of the permanent library of the Academy and deposited with the Editor.

The shingles for the new members were presented at the end of the meeting. The Academy is indebted to the artistic ability of Harvey Coleman, Jr., Eutaw, for the inscription of these.

A motion to adjourn was made by A. J. Westland of St. Louis University, and seconded by S. J. Lloyd. Carried. Adjourned at 5:45 P.M.

DATA ON REGISTRATION, PAPERS, Etc.

Sections _____	I.	II.	III.	IV.	Total
Members registered _____	42	26	18	6	112
Non-members on programs _____	2	8	2	5	17
Members absent _____	10	13	2	8	33
Papers presented _____	22	15	11	12	60

REPORT OF THE TREASURER FOR THE YEAR ENDING APRIL 1, 1937

RECEIPTS

Balance on hand March 19, 1937 _____		\$119.90
Membership fees received during year _____	\$290.00	290.00
		<hr/>
		\$409.90

DISBURSEMENTS

R. S. Poor (68) postage _____	2.61	
Gerald Thomas (69) Jr. Academy _____	10.00	
Birmingham Printing Co. (70) Auburn programs _____	29.00	
A. G. Overton (71) telephone to Auburn _____	2.20	
R. S. Poor (72) stamps for Journal _____	5.58	
Birmingham Printing Co. (73) on account Journal _____	100.00	
Cash (74) stamps for treasurer _____	5.00	
Birmingham Printing Co. (75) balance on account _____	63.15	
Cash (76) stamps for treasurer _____	4.00	
Visitation Academy (77) Jr. dues missent _____	1.00	
Check returned _____	2.00	
Septima Smith (78) expenses _____	24.33	248.87
		<hr/>
Balance April 1st, 1937, Tarrant Branch 1st National Bank _____		\$161.03
		<hr/>
		\$409.90

B. F. Clark, Treasurer.

Audited and found correct, April 2, 1937.

Auditing Committee:

EMMETT B. CARMICHAEL
J. H. COULLIETTE
PETER A. BRANNON

REPORT OF THE COUNCILOR, A.A.A.S.

Since the Auburn meeting communications were received from Dr. Otis W. Caldwell, General Secretary of the A.A.A.S., and Dr. S. W. Bilsing, Secretary of the Academy Conference. The first, dated May 2, 1936, made known the action of the Executive Committee with regard to the research grants to Academies. The committee voted 1 ("that the sum of each research grant for 1936-7 is to be based upon the number of members in good standing in both the Academy and the A.A.A.S."); 2 ("the Academy is asked to report to the A.A.A.S., the number of members common to both organizations"); 3 ("when the amount of the research grant has been determined as based upon the Academy report of number of members in good standing common to both organizations, the research grant shall be forwarded to the proper officer in each academy and disbursed directly to the Academy. Reports of the research assignments made by the Academy are to be sent in accordance with the vote quoted herewith").

This letter was sent to the President of the Academy with the request that the information asked for be forwarded to Dr. Caldwell.

Dr. Bilsing's letter asked for suggestions regarding the program of the Academy Conference at Atlantic City and for news about the activities of our Academy. I suggested that the subject of the Academy Conference should be reports from the representatives of the various academies on the work of their organizations. The story of our Auburn meeting was sent for the newsletter.

The winter meeting of the A.A.A.S., was held at Atlantic City instead of Washington because of the nearness of the inauguration in the latter place. It lasted from December 28 to January 2 and was attended by 2,375 persons.

The principal actions of the Council were:

1. Change of the name of Section P from "Manufacturers and Commerce" to "Industrial Science". I took part in the discussion on the subject and told of the success of our section of "Industry, Economics and Geography".

2. Approval of the policy of strengthening the ties between the association and the British Association for the Advancement of Science and organizations of similar character in other countries.

3. Discussion of the problem of intellectual freedom. On the motion of the General Secretary, Dr. Otis W. Caldwell, it was voted to link with the problem of intellectual freedom the correlative one of social responsibility. The already existing committee of three for these problems consisting of Dr. Isaiah Bowman, Chairman, Dr. McKenn Cattell, and Dr. H. B. Ward was retained and two new members added, namely, Dr. E. G. Conklin, the retiring president, and the incoming president. This committee was to persist in its efforts to cooperate with other bodies and report its activities to the Council and the General Assembly every year.

4. Acceptance of the American Science Teachers' Association as an "associated society".

5. Resolution to cooperate with the Ecological Society of America "to protect exemplary natural areas in this country from ill-advised encroachment".

New officers of the Association elected were: President, Professor George D. Birkhoff, mathematician of Harvard University; Permanent Secretary, Dr. Forest W. Moulton; Members of the Executive Committee, E. G. Conklin and H. B. Ward; Members of the Council, Vincent du Vigneaud and Sam F. Trelease.

There was an increase in membership of the Association of 305 during the year, making the total on September 30, 1936, 18,242.

The Academy Conference was held on Monday afternoon, December 28, and the following business was transacted:

1. Report of the Committee appointed to ascertain what disposition had been made of the A.A.A.S., grants-in-aid for research. This report was given to the members in mimeographed form and may be consulted by anyone interested. Dr. Caldwell suggested that committee be appointed to prepare a model form for request of grant. Dr. O'Kane of the New Hampshire Academy advocated written reports as the research progressed.

2. Reports by members of the Conference on the activities of their respective academies.

Since the last meeting a new state academy was organized in Florida. It already has 275 members. While in Florida last summer I called on the President, Dr. Kurtz, of the Florida State College for Women, and had an interesting talk with him on academy affairs.

Dr. E. Carrol Faust of the New Orleans Academy was elected Chairman of the Conference for the coming year and Dr. S. W. Bilsing was re-elected Secretary.

The Summer Meeting of the A.A.A.S., will be held in conjunction with the Pacific Division at Denver from June 21-26 and the next winter meeting at Indianapolis from December 27 to January 1.

—P. H. Yancey, Councilor.

REPORT OF THE RESOLUTIONS COMMITTEE

Whereas the Alabama Academy of Science has just held its fourteenth annual meeting at the University of Alabama

And whereas it was the unanimous opinion of the members of the Academy present that the success of the meeting was due not only to the carefully made and well executed plans of the Administration and Faculty of the University of Alabama and the Officers of the Geological Survey but particularly to the untiring efforts of the President of the Academy, Dr. Walter B. Jones

It was resolved by a motion duly made, seconded, and passed at the closing session of the Fourteenth Annual Meeting that a Resolutions Committee express to the University of Alabama appreciation for the generous hospitality extended to the Academy as a whole, and for the numerous courtesies shown to individual members.

It was resolved further that copies of these resolutions be forwarded to Chancellor George H. Denny and to President Richard C. Foster, and that a third copy be spread upon the minutes of the Academy.

Respectfully submitted,

R. S. Poor, Chairman
P. H. Yancey
J. G. Carlson

IN MEMORIAM

Rev. Bede A. Knapke

The Rev. Bede A. Knapke, O.S.B., M.A., late professor of Biology at St. Bernard College, St. Bernard, Ala., was born at Cincinnati, Ohio, February 27, 1886. He came to St. Bernard in September, 1897. After successfully completing the required courses of studies, he joined the community of Benedictine Monks at St. Bernard with his religious profession on July 2, 1906. Six years later, June 23, 1912, he was ordained priest by the late Bishop E. P. Allen, D.D., of Mobile, in St. Paul's Church, Birmingham.

For twenty-six years Father Bede was connected with St. Bernard College in teaching science and filling various official positions. Shortly before his death, he had been appointed Secretary-Treasurer of the school. It was especially in the capacity of professor of science that he became widely known.

He received his scientific training at Columbia University, New York, where he received his M.A. degree in 1925. Later he studied at The Marine Biological Laboratory, Woods Hole, Mass.

Father Bede was well known throughout the South for his extensive researches and detailed recordings both in Biology and Botany.

He was a charter member of the Alabama Academy of Science.

His death occurred on January 13, 1937, at Mt. Carmel Hospital, Columbus, Ohio, from a complication of ailments from which he had been suffering for some time.

His loss was keenly felt by the community at St. Bernard and his name will be kept in remembrance by the many students who have been under his care during the past thirty years.

REPORT OF THE EDITOR OF THE JOURNAL

The Editor is greatly indebted to Dr. R. S. Poor of Birmingham-Southern College for taking over the publication of Volume 8 of the Journal. Dr. Poor is to be congratulated on getting abstracts for one hundred percent of the papers on last year's program. It is sincerely hoped that the Vice-Presidents will secure for me an abstract of not more than two hundred and fifty words of each paper on the program this year.

We have carried out in modified form the plan adopted at the Florence meeting in 1935 and are bringing out Volume 9 of the Journal in two parts. Part 1 is devoted mainly to the program with a very brief abstract of each paper. Special mention should be made of the very fine statement of the "Aims and Objectives of The Academy" by our President.

Since our last report we have added the Louisiana Academy of Science and the Northwest Scientific Association to our exchange list¹ and the General Library of the The British Museum of Natural History has asked for a complete file of our Journal which has been supplied with pleasure. We now have twenty-six exchanges and five non-exchange depositories and an exchange library of over three hundred titles.

E. V. JONES, Editor.

¹A list of former exchanges was published in Volume 7, page 14.

ANNUAL ADDRESS OF THE PRESIDENT OF THE ACADEMY

CONSERVATION OF OUR NATURAL RESOURCES

—Walter B. Jones, State Geologist of Alabama.

For thousands of years our Commonwealth has been occupied by human beings, representing a wide diversity of race and speech. Many of these peoples have been primitive and certainly some have belonged to what we generally call civilized races. Whether primitive or civilized, the effect of human occupation of the land has been the same—that of taking therefrom a livelihood. Little thought has ever been given to replacement. The general result has been that our forests are disappearing, much of the cream of our mineral deposits is gone. Our soils have become impoverished or allowed to wash away, our lakes are becoming swamps and our streams filling with silt and sediment; our wild life is disappearing to an alarming degree, and we are occasionally unable to see the sun because of great clouds of dust rising from a new desert where once roamed great herds of buffalo, and other important game animals.

It was said of the Indians that they never took more than they could use. It is no credit to our civilization that we have brought about the extinction of the buffalo and the wild pigeon, for no other reason than our mad desire to kill. The Indian would have assumed that he must be dependent upon the land for his food and clothing. Our civilization has always assumed that in some way a magic wand could be waved over the land, providing thereby ample supplies of the comforts and luxuries of life. Truly the land has been flowing with milk and honey. Alas, the sad awakening is at hand as we come to the full realization that the supply may become less than the demand. On many occasions our people have given ample demonstration of their resourcefulness. If the catastrophe of greater demand than supply should come upon us, we would have need of all the resourcefulness at our command.

It is intended that this discussion tonight be in the simplest possible language and that it cover only the fundamentals involved. When confronted with matters of great moment, one should get clearly in mind the basic principles. The ultimate solution of our problems must cover all of the facts for it must be obvious to everyone that the solution to one problem will not in itself solve the rest. Many of these things go hand in hand, and the correcting of one point may make much easier the correcting of another.

There are no frontiers left in Alabama, and indeed there appear to be none left in the United States. We are in a period of transition between a widely expanding, budding young nation and a thoroughly sedentary one. The destruction of great forests for the sole purpose of building a few log cabins and providing space for crops, is no longer possible. Each year some land is cleared for planting in various crops but little of that area could rightly be classified as real forests. As we pass into the second period of our existence, our success will depend upon our solution of the great problems bequeathed us by the ruthlessness of the hand of economic civilization during the first period.

If I were asked to name the greatest of our problems, I would reply, without any hesitation or mental reservation, LAND USE. We have cleared lands for cultivation which were not fitted for profitable crops. We have abandoned lands which then disintegrated in a very

short time. We have cultivated prairies which have as a result sent great dust storms into the remotest parts of the nation. We have destroyed so much humus that the rain water has developed an extremely rapid run off, bringing greater and greater floods on us and before us, while an even greater catastrophe, that of a gradual lowering of the water table, is making itself felt in many ways. The solution of the problem of proper land use is a very simple one. It is very well known just what can and what cannot be done with the various types of soil. We must restrict the use of that soil to the purposes for which it is best suited. This solution, simple as it is, will not be easily attained. Our people are perhaps the most pig-headed in the world. If a sawmill company buys a piece of timber they can cut and destroy every living thing in that portion of the forest and there are no questions asked. If a turpentine company wants to burn off the woods every year, that their workmen might more easily see the rattlesnakes, if any survive the fire, there are no questions asked. If a farmer wishes to abandon to soil erosion a hundred or a thousand acres of land, it appears to be nobody's business. If a mine, mill, or even a city, wishes to discharge undesirable refuse into a stream, it appears that no one should voice a protest. However, the depletion of forests, the appalling rate of soil erosion, the destruction or diminishing of our wild life resources, and the pollution of our streams are problems affecting every man, woman and child of our present generation, and of future generations.

It has been stated by no less an authority than J. N. ("Ding") Darling, President of the National Wild Life Federation, that in thirty-five years from now the increasing curve of civilization will meet the decreasing curve of tillable soil, beyond which our nation cannot pass without paying the penalty. It is estimated that three acres per capita will be required for the sustenance of our people. We are fast approaching that minimum. It, therefore, becomes a dire necessity that we begin now to rehabilitate some of our worn out farm lands, return others to cover crops or forests, and take better care of those now in production. The necessity is no more apparent than is the severity of the penalty which must follow if we continue to procrastinate.

The second most important problem, in my opinion, is that of the everlasting desire of so many of our people to burn sedge fields, grass lands, forests and everything else that can be burned. We can scarcely conceive of any greater tragedy than the burning of our homes. And yet, we give little or no thought to the burning of the homes of the beetles, birds, and animals; the destruction of the food supply of any which might survive; the obliteration of all cover by which these things escape enemies, the turning to ashes of much of the humus in the soil thus burned over, laying bare the soil to make more effective the agencies of erosion, oftentimes, the killing of plant life and young trees and generally wreaking havoc with scarcely a single benefit to offset the wholesale damage done. It has been set forth and perhaps properly so that control burning is beneficial to long-leaf pine forests. In my own humble opinion, the resultant damage to wild life more than offsets any good that could come to long-leaf pine forests. In all other types of area, it is difficult to find even one tiny little bit of advantage, even in controlled burning.

One example of the destructive force of forest fires will remain forever in my mind. Perhaps each of you may recall similar occurrences. Last June our field party made camp in a woodland in Randolph County. For some months, a sawmill outfit had been operating in that vicinity. According to the American custom they had felled the trees,

taking such logs as could be easily and suitably cut into lumber, leaving the great pine tops above the first limbs. Soon after we had made our camp, two heavy wagons approached bearing various items of saw-mill equipment. With the wagons were five able-bodied men. They announced to us that the forest fire which we knew to be burning and thought was headed away from our camp, was actually travelling toward our camp and would reach us in a few hours if not headed off. We immediately decided to try to put it out, but could get no help or encouragement from the men who would profit most in case the fire could be extinguished. We gathered some pine tops and marched into the fray; seven men against a mile of fire. As we approached the burning area, we found that we had selected for ourselves a most difficult job. The pine tops one by one went roaring into the sky, often burning out the tops of pine trees still standing. However, we found that we could conquer the fire as it was burning in the leaves from one pine top to the next. After eighteen hours of steady fighting, seven men covered with grime stumbled slowly back to camp, after having accomplished what they had set out to do. Every man in that party knew the full meaning of "Well done thy good and faithful servant."

As that fire roared through the night, the plaintive notes of the birds whose nests were being destroyed and themselves as well, the distressed calls of the animals and the subsequent headlong flight of those old enough to run, the realization that little could survive that wanton and useless destruction, would make of any man a fire prevention conservationist.

It is unfortunate that so many of us have ears which are not so tuned that they hear the signals of distress of the myriads of inhabitants of an area being destroyed by fire. Yet a legend has been handed down to us through the centuries, that "You should not destroy your house to rid it of mice."

We are now trying to cultivate, or have abandoned, lands which might well be returned to forests, comprising a profitable crop for the landowners. Land suited to short-leaf pines will grow in pulp wood one cord per acre yer pear. That has been demonstrated on my own patch of woodland of twenty-seven acres, nine miles from where we sit tonight. In ten years, a twenty-seven acre tract has grown two hundred and seventy cords of pulp wood. During that time it has cost thirty dollars to keep out fire. That expenditure has been worth while. The young trees grew from eight to twelve inches in diameter in ten years, while some of the larger stuff left when the area was cut over ten years ago, has reached saw-timber size. There are millions of acres of such land in Alabama. I commend to the owners of such lands, the consideration of profitable crops of timber, as a marked improvement over the existing system of eking out a bare living from the greatly impoverished soils now existing in that great expanse of territory.

Perhaps the next most important of our problems is that of soil erosion. This problem should not be new to us for we have definite records of the collapse of former civilizations which paid no heed to that fundamental matter. It has been definitely established that the great Mayan Empire collapsed because of the adverse conditions which resulted directly from the lack of control of erosional agencies. Whether we realize it or not, we are gradually but steadily heading in the same direction. All of our lakes are not yet swamps and we still have a few streams which are not veritable mud holes. Nevertheless, it is

vital that we greatly increase our activity in the matter of ample methods of control. Through the several state and federal agencies, we are getting demonstrations of adequate methods for some of the problems of soil erosion control. However, we have not yet approached the most serious problem, namely, prevention of conditions favoring soil erosion and thus avoiding the necessity for methods of control. In my opinion, we must no longer sit idly by and see our neighbor so denude his lands as to set up ideal conditions for soil erosion. The effect of soil erosion is widely distributed through the community, through the State, and even through the Nation. It thus becomes a national problem, for, if a landowner is not willing to so guide his own actions as to protect his neighbor from the ill effects of that action, he should be made to do so by due process of law.

The methods of soil erosion control are not particularly expensive nor complex. Certainly the increased returns, whether calculated in farm crops or forest products, will more than compensate the landowner for his care and work. In augmenting his own income, he likewise brings about better conditions, the influences of which will extend throughout the Nation.

Among the more important corrective measures are the planting of bare fields; terracing steep hillsides which are prone to wash; sane cutting of forests; proper and adequate drainage ditches with sufficient alignment of trenches to insure even runoff of the water; prevention of fires and otherwise corrective measures for building up humus in the soil; and the proper use of the land involved.

It is still a common sight to see some farmers burning off sedge and other grass fields in the Spring, for the sole purpose of making the plowing of that field somewhat easier. One might just as well burn vetch or other cover crops. To continue such a practice year after year simply means that the field or fields so treated will become so impoverished that they can no longer be profitably farmed. Where subsoil is thin and does not respond swiftly to corrective treatment, such lands must of necessity remain out of production for several decades. It is of the very greatest importance that we stress now the necessity for abandoning such destructive practices, that the increasing curve of population may likewise find an increasing curve of productive soils.

One other matter with which I am more directly concerned is that of waste in the production of mineral and other raw materials, in the industrial development of our State. A clear and at the same time tragic example, may be found in the mining of the Big Seam in the red ore mines of the Birmingham District. This seam is about twenty feet thick and perhaps only eight feet have been found to be sufficiently high grade for commercial production. The remaining and larger part of the seam has been left in the mines where it can never be profitably recovered. Years ago we should have been bending every effort to research work in order that some plan might be devised whereby all of this ore could be profitably taken. Some work has been done. I submit that the research program should have been very greatly enlarged. In the bauxite district and particularly in Talladega, Calhoun, Cherokee, and DeKalb counties, only the very best of the bauxite was taken out and little or no effort made to either concentrate the lower grade material or to devise ways and means of utilizing the lower grade ores. In Cherokee County, there are thousands of tons of low-grade bauxite, some of it running as high as 52% alumina, now mixed in the dumps with clays and soil. It is doubtful whether this material ever

can be recovered. In some of the pits, especially in Cherokee County, much high-grade ore was left in place because the cost of stripping had become prohibitive. In one pit at least twenty thousand tons of high-grade bauxite was covered by a cave-in of the banks and now lies buried under one hundred and ten feet of debris and water. It so happens that bauxite is one of the strategic minerals of our nation and waste of that material is certain to become embarrassing. In some of our coal mines, we have been guilty of great waste, both from improper mining methods and from deliberate neglect. In one small mine in Walker County seven hundred and fifty thousand tons of removable coal was left in mine pillars which could have been easily and inexpensively removed. After perhaps ten years of abandonment, this coal is forever lost. These specific examples merely serve to point out that we are a wasteful nation and that we should give some thought to the conservation of our mineral resources. I do not intend to leave with you the impression that we should quit mining the red ore seam, just because we can't use it all under existing practices, but I do submit to you the importance of a greatly increased research program looking toward the proper utilization of all of our mineral resources. This action I consider to be basic and fundamental. For many years we have spent substantial funds in agricultural research. We have found during the recent and lamented depression that when industry collapses so does agriculture collapse. It should be obvious to us all that no one group can enjoy any measure of prosperity unless there is essentially the same measure of prosperity for all. We should be spending for industrial research amounts proportional to those spent for agricultural research.

Deliberate waste should not be tolerated under any circumstances. In my opinion, land ownership or mining lease does not entitle one to waste through choice, or otherwise, mineral resources upon which the future of the nation must depend. If such ownership or lease now affords that right, then the intent and purpose of the covenant is misguided and misdirected, and any such right should be removed. Perhaps the losses resulting from any such practices will not be felt during your generation and mine, or the next, or even the next. However, it is certain that some future generation will suffer because of our slipshod methods in our treatment of our heritage. That generation will place the blame where it properly belongs. We might as well admit here and now our guilt and attempt to do something about it.

I wish to make an appeal for the conservation of our wild life resources. During my boyhood days on the farm, I was literally surrounded with myriads of game and song birds, an abundance of upland game animals, clear ponds, and a beautiful creek filled with sparkling water in which fish abounded, and very fertile soil on which we raised bumper crops. Now the ponds have been completely filled up with silt, many of the song birds have disappeared because there remain no nesting places and feeding grounds. There is scarcely a bunch of grass, so effectively is the farming accomplished, to hide a rabbit. The creek is burdened with mud brought down from neighborhood farms which are gradually washing away. Because of silt, seining the fish, and to some extent over-fishing legally, there are few fish left in this once beautiful stream.

Is it to be that our grandchildren shall never know the pleasure and genuine satisfaction of sitting on the bank of a stream, fishing, with any hope of catching anything? Are they never to know the spontaneous loveliness of the song of the mocking bird? Are they to never have the thrill of the sudden whirl of wings when a covey of

quail take to the air from in front of a bird dog's nose? Will they ever see a live mink or a raccoon? Will meadow larks be nesting in their pastures? Will any of the snails survive the rigors of continued clearing and burning? Can we preserve even a few acres of virgin timber? If they are to see and love any of the fine things which have thrilled us all, we must take immediate steps to preserve for them and for their pleasure and appreciation, some of the noble things of life, which unfortunately are not linked with the almighty dollar.

ABSTRACTS OF PAPERS PRESENTED

April 2 and 3, 1937

SECTION I

BIOLOGY AND MEDICAL SCIENCES

SPECIFIC FUNCTIONS OF AFFERENT FIBERS AS SHOWN IN EXPERIMENTS WITH THE CATHODE RAY OSCILLO- GRAPH.

—A. Sidney Harris, University of Alabama.

Previously reported experiments (Harris, *Am. Journ. Physiol.* 112, 231, 1935) have shown that in the bullfrog, cutaneous afferent fibers, distinctive in the reflex responses that they evoke, can be identified in terms of conduction rate, threshold to induction shock stimulation, and by correlation histology. So unequivocal are these distinctions of function in the different groups of fibers that they have been incorporated in our student's laboratory manual and are given multiple confirmation year by year in student hands with green frogs.

Mammalian experiments on reflexes evoked from the plantar nerves offer equally convincing evidences of specificity of reflex effect of afferent fibers. The medial plantar is the chief nerve of cutaneous supply to the planta of the dog's hind foot. Excitation of only the largest and most rapidly conducting fibers in this nerve evokes a reflex of limb extension apparently postural in kind. When the excitation includes smaller (pain) fibers a flexor pattern is superimposed upon the extension, but the flexion does not dominate to the point of reversal. Changing the central bias or the frequency of stimulation does not alter the quality of response of the distinctive group of larger fibers. The lateral plantar nerve, deep to the superficial tendons, does not evoke the extensor pattern or response, although it contains many fibers of the same size and conduction rate range as those in the medial plantar that do evoke this response. These are chiefly fibers to supply muscle. The tibial, containing both the plantars gives variable reflex responses as might be predicted from the functional mixture of afferents present.

EVOLUTIONARY PROBLEMS IN SOME ALABAMA WEEDS

—Roland M. Harper, Geological Survey of Alabama. University.

There are many weeds in Alabama, and elsewhere, which are found only in habitats that could not have existed here a few centuries ago, such as fields and roadsides. Some are known to have been introduced from other countries, but many are known only in the United States, and may have originated in some way in modern times. Three examples were exhibited and discussed.

Viola Priccana, described from Kentucky, seems to have been entirely unknown to botanists forty years ago, though it is so distinct from all other known violets that it could hardly have been overlooked if it had been at all common then. In Georgia and Alabama it seems to grow only in cities and towns, where it is sometimes cultivated for ornament. It has every appearance of being an escape from cultivation, but if so where did it come from originally?

Aphanes australis, a diminutive weed of the rose family, growing on lawns in several Alabama counties, and as far northeast as Washington, D. C., was formerly referred to *Alchemilla arvensis*, a European species. But in 1908 Rydberg found some slight differences between it and the European plant, and gave it a new name. Has it developed from *A. arvensis* in recent years, or has it been here all the time?

Senecio Alabamensis, described about 35 years ago from southeastern Alabama, was found in February, 1937, in southwestern Georgia. There it grew only in patches of carpet-grass, a pasture grass introduced from the tropics, which hugs the ground so closely that fire cannot run through it, and thus protects the *Senecio* from fire. If the *Senecio* was here before the carpet-grass, what protected it then?

 THE BIRDS OF CUBA

—P. H. Yancey, Spring Hill College, Mobile.

The original sources for the ornithology of Cuba are La Sagra, "Historia física, política y natural de Cuba"; Poey, "Catálogo Metódico de las Aves de la Isla de Cuba"; and Gundlach, "Ornitología Cubana." With the aid of these the author studied the birds of Cuba during three Summers spent on the island and presented descriptions of the more important of the permanent residents. These belong to eighteen orders and thirty-five families.

The most conspicuous bird in Cuba is the Turkey Buzzard (*Aura tiñosa*—*Cathartes aura septentrionalis*) which performs a much needed service as a scavenger. In the same order (Falconiformes) are several species of hawks and falcons and one eagle, the Caraira (*Polyborus Auduboni*) called by the natives "King of Buzzards."

Among the owls (Strigiformes) is the smallest species, the Sijú platanero (*Glaucidium si ju*) which is also unique in being a day bird.

The best singing birds are the Sinsonte or Mocking Bird (*Mimus orpheus*), the Canario de Manglar (*Dendroeca Gundlachii*) and the Ruiseñor (*Myiadestes Elizabeth*).

The world's smallest bird, the Pájaro mosca (*Calypte helena*), a species of hummingbird (Order Micropodiiformes) is a native of Cuba.

There is only one species of wild fowl, the Codorniz or Cuban Quail (*Colinus cubanensis*) smaller than our Bob White.

The most characteristic birds of the Island belong to the order Ciconiiformes, the most gorgeous being the Red Flamingo (*Phaenicopterus ruber*) and others, the Little White Egret (*Garzetta candidissima*), the Roseate Spoonbill (*Platalea ajaja*), the Green Heron (*Butorides visrescens*) and the Least Bittern (*Ardita exilis*).

THE CATHODE RAY OSCILLOGRAPH AND THYRATRON OSCILLATOR APPLIED TO THE STUDY OF NERVE ACTION. DEMONSTRATION

—A Sidney Harris, University of Alabama.

The cathode ray oscillograph as an instrument to study the action potentials of nerve will be demonstrated. Measurement of the rate of conduction of the nervous impulse in the fibers that are active, the configuration of action potential complex under various conditions, relative threshold to electric shocks of various fibers and fiber groups and other phases of oscillographic study that have been helpful in elucidating the physiology of nervous action will be shown and discussed.

The thyatron oscillator is valuable as an adjustable frequency stimulator which delivers shocks of stable but controllable intensity without the complication of keys which may chatter or otherwise function imperfectly, especially at high frequencies. The thyatron is used also as a stimulator synchronized with the sweep of the cathode ray oscillograph. In this service, also, it eliminates the imperfection of the key. In this demonstration the thyatron will be utilized for nerve stimulation. When used in conjunction with the 60 cycle A. C. wave the oscillator serves as a device for measuring the speed of oscillograph spot.

GERMINATION OF CROTALARIA SEEDS AFTER REMAINING LONG IN DRY SOIL

—J. F. Duggar, Alabama Polytechnic Institute, Auburn.

The untreated seeds of *Crotalaria spectabilis* were repeatedly found to be extremely low in germination when the seeds were tested on moist blotting paper in an incubator maintained at 81 degrees Fahrenheit.

Likewise untreated seeds planted one-inch deep in air-dry Cecil clay soil,—and immediately irrigated with hydrant water in measured amounts equivalent respectively to one-half inch, one inch, and two inches of precipitation, each repeated at varied intervals,—afforded germination aggregating only 4 to 15 per cent through a period of 40 days in midsummer. Natural rainfall was excluded by movable covers. The minimum, 4 per cent, resulted from intermediate amounts of added water, equal in the aggregate to 6 and 8 inches in a period of 28 days. The maximum germination, 15 per cent, followed the minimum irrigation, namely half-inch applications, totaling two inches of precipitation.

Unexpectedly, prompt germination of 61 and 63 per cent occurred where untreated planted seeds were allowed to remain inactive for 21 and 30 days respectively in this clay soil kept extremely dry by the recurring heat of the midsummer sun.

The writer briefly discussed several working hypotheses to be confirmed or refuted by planned future experiments, any one of which, if found applicable, might explain the mechanism by which seeds, having seed coats that in nature are almost impermeable, became permeable to added soil moisture as the result of preliminary burial in very dry clay soil.

A NEW AND UNIVERSAL CULTURAL MEDIUM FOR DIFFERENTIATING HAEMOPHILIC ORGANISMS.

—Ralph McBurney and Louise Cason, University of Alabama.

Because of the selectiveness of the pneumococci for the spleen in the laboratory mouse test for pneumococci, special splenic infusion and splenic hormone media have been investigated. The hemophilic organisms require frequent transfers for longevity and because of their fastidiousness for blood or blood serum in cultural media, defibrinated blood has been added to this splenic agar.

Definite increase in length of life of the organisms and luxuriance of growth has been demonstrated.

DIFFERENTIAL COUNTS OF THE ISLET CELLS OF THE DOG PANCREAS

—Thomas E. Hunt, School of Medicine, University of Alabama.

Differential counts of the alpha, beta (insulin) and delta (Bloom) cells of four dog pancreases have been made, the respective average percentages being approximately 20, 75 and 5. The tissues from which the counts were made were taken from various regions of the tail, body, head and vertical process. After fixing the tissue in Zenker-formol, 4 μ sections were obtained and stained with the Mallory-azan technique. The nuclei of all the islet cells from one section of each block were counted. The percentages vary slightly in the different regions and in the different animals and greatly in the individual islets. To date approximately 2000 islets with an average of thirty cells per islet have been counted.

ALABAMA DRAGONFLIES (ODONATA)*

—Septima Smith and Robert S. Hodges, Department of Zoology, University of Alabama.

During the past two years about 2500 specimens, representing 95 species of dragonflies have been collected in ten Alabama counties by the authors and students of the Department of Zoology. Of these 68 species belong to the suborder Anisoptera of dragonflies proper and 27 to the suborder Zygoptera or damselflies. Substantial additions to this collection, especially of Zygoptera, is anticipated. Considerable attention has been given to larval forms, 31 species of Anisoptera having been reared from their nymphs. The adults of 5 species of rapid dispersal habits have in this way been added to the collection. At least 125 species for the two suborders may be expected to be found in this state.

Owing to accessibility permitting frequent visits to collecting localities throughout the season the more systematic collecting has been done in Tuscaloosa county. This county near the center of the state is divided about equally by the fall line separating the Paleozoic areas of the southwestern terminus of the Appalachians from the Gulf Coastal Plain. That it offers a diversity of habitats is indicated by the fact that 82 of the 95 species, 57 Anisoptera and 25 Zygoptera, are to be found here.

Many of the species collected are of wide distribution in the eastern United States. In this group, but at present collected only from Mobile county are *Gomphaeschna furcillata* and *Nasiaeschna pentacantha* and from Tuscaloosa county *Anax longipes*, *Neurocordulia obsoleta* and reared specimens of *Helocordulia selysi*. Others apparently reach their southern limit in south Alabama where are to be found certain regional or related southeastern forms such as *Coryphaeschna ingens*, *Cannacria graxida*, *Celithemis amanda*, *ornata* and *verna* and the salt marsh form of the Atlantic and Gulf coast *Erythrodiplax berenice*. Of interest, in addition to these, is the collection of *Orthemis ferruginea* in Choctaw county and *Erythrodiplax umbrata* in Washington county, both neotropical species. Tuscaloosa county affords *Dythemis velox*, a western species, the nymphs of a species of *Lanthus* commonly associated with the Appalachians and reared specimens of a species of *Ophiogomphus*. All the above indicate a rather varied and interesting Odonata fauna for the state, of which there are practically no previous records.

Summary of Alabama Odonata collected during 1935 and 1936

Suborder	Family	Subfamily	Ten Counties including Tuscaloosa Co.		Tuscaloosa County	
			Genera	Species	Genera	Species
Anisoptera	Aeschnidae	Petalurinae	1	1	1	1
		Gomphinae	6	13	6	12
		Aeschninae	8	9	5	6
		Corduligasterinae	1	2	1	2
	Libellulidae	Macromiinae	2	4	2	4
		Cordulinae	5	6	5	5
Libellulinae		13	33	11	27	
Zygoptera	Agrionidae	Agrioninae	2	4	2	4
	Coenagrionidae	Lestinae	1	2	1	2
		Coenagrioninae	6	21	5	19
Total			45	95	39	82

*This research has been aided in part by The Alabama Academy of Science grant from the A. A. A. S.

RECIPROCAL TRANSLOCATIONS OF THE II AND III CHROMOSOMES IN THE SOMATIC AND MEIOTIC DIVISIONS OF *D. MELANOGASTER*

—Dale C. Braungart, University of Alabama.

Theoretical considerations of the chromosome ring formation in the first meiotic metaphase in certain plants has led to much speculation concerning the probable association of the homologous chromosomes effecting such rings. Belling, about 1924, suggested that the phenomenon of ring formation was attributable to segmental interchange.

In the *Drosophila melanogaster* material used in this investigation reciprocal translocations between the second and third chromosomes had been obtained by x-ray. Cytological analyses of both somatic and meiotic tissues were made.

The usual methods of culturing *Drosophila*, dissecting testes from larvae and pupae, preparing ganglia by the aceto-carmin method, and cutting paraffin sections of testes were used.

The phenomenon of somatic pairing as seen in the ganglia parallels that seen in *Oenothera* by Cleland. It is variable from cell to cell. References to the drawings prepared explain the rings and chains seen.

A description of pairing in the testes strengthens the theory of Belling. The characteristic ring formations previously described are now shown to occur in the meiotic divisions of the testes of this fly. Circle formation was seen to take place between the II and III chromosomes during the first metaphase division of maturation.

These results together with those of Sturtevant and Emerson, Dobzhansky, Cleland and Blakeslee, and others prove the validity of Belling's theory. The situation formerly designated as telosynapsis is a misnomer.

A METHOD FOR THE RAPID DETERMINATION OF ENTEROTOXIC STRAINS OF STAPHYLOCOCCI IN FOOD POISONING OUTBREAKS.

—Ralph McBurney and Louise Cason, University of Alabama.

Bacterial free filtrates of staphylococci isolated from food poisoning outbreaks that were non-toxic to experimental animals when grown in nutrient broth; either under ordinary oxygen or 30% CO₂ tension, proved toxic when grown in a modified custard medium.

Comparison of twenty-five different strains on a nutrient milk agar with reactions on Stone's medium gave parallel results.

Simplicity in composition, rapidity in identification, accurate isolation of enterotoxic strains, and maximum enterotoxin production are outstanding factors.

A SURVEY OF INTESTINAL PROTOZOA IN AN ORPHANAGE.

—J. H. Starling, Troy High School, Troy.

In the summer of 1936 a stool examination was begun among the inmates of an Alabama orphanage. This survey has resulted in a total of one hundred thirty-five examinations. The author proposes here to state the conclusions drawn from the results obtained by a

study of the Iodine Stain only. The permanent smears are to be studied after the entire survey of three hundred examinations has been completed.

First, Sixty (44.4 percent) of the one hundred thirty-five stools examined were infected with some species of intestinal parasite. Examinations showed the following parasites, named in order of their frequency, giving their respective percentages: (1) *Endamoeba coli*, 14 percent, (2) *Blastocystis hominis*, 11.9 percent, (3) *Giardi lamblia*, 11.1 percent, (4) *Endolimax nana*, 11.1 percent, (5) *Iodamoeba williamsi*, 3.7 percent, (6) Hookworm, 1.5 percent, (7) *Endamoeba histolytica*, .75 percent. It might well be noted here that upon investigation it was found that the inmates of this institution are tested and treated annually for hookworm. The author concludes that this explains the low percentage of hookworm present.

Second, the comparison of the infections among males and females showed that a higher percent of *Endamoeba histolytica*, *Iodamoeba williamsi*, *Giardi lamblia*, *Blastocystis hominis*, and Hookworm was present among males; and that a higher percent of *Endamoeba coli* and *Endolimax nana* was present among females.

Third, the percent of incidence of infection was higher between the ages of one to seven, with the exception of *Endamoeba coli* which showed a steady increase as age advanced, and *Endamoeba histolytica* and *Blastocystis hominis* which both showed a higher frequency among the ages between seven and fourteen.

TRENDS IN MEDICAL EDUCATION IN ALABAMA.

—Stuart Graves, Dean of School of Medicine, University of Alabama.

The recent joint survey of medical education by the several standardizing agencies has emphasized higher standards of admission and instruction, more and better teachers, fewer and better students. Since 1928 the University of Alabama School of Medicine has been undergoing a quiet but thorough reorganization. In the selection of the present faculty consideration has been given to their character and their ability and cooperative desire to teach medicine as their first responsibility. The importance of research has not been neglected, however, and practically every teacher has appeared periodically on the program of his group among the scientific societies. Minimum admission requirements qualitatively and quantitatively are equal to those of the best medical schools.

The entering class has been limited to fifty. An ever increasing proportion of the matriculants are residents of the State. 100% of the students who have finished the first two years with clear records since 1928 have been transferred to thirty-three approved four-year schools. Of these less than 0.6% have failed of promotion and graduation. The school has been fully approved by the A. M. A. Council and has been a member in good standing of the Association of American Medical Colleges since it was founded in Tuscaloosa. Its future as a two-year school is assured by recent final action of the Council in determining to list those two-year schools which meet the higher standards as Approved Schools of Medical Sciences. It is the purpose of the University to continue to improve the school until, when the proper time comes, the University may be trusted to expand it into a small, high class four-year school, devoted to the improvement of medical education and practice in Alabama.

AN INEXPENSIVE MICROSCOPE LAMP FOR CRITICAL ILLUMINATION.

—J. Gordon Carlson, University of Alabama.

A microscope lamp with light of adjustable intensity, which will afford critical illumination of a quality comparable with that of lamps on the market priced several times higher, can be constructed at a cost of five to six dollars.

A 50 c.p. 6-8 v. single filament auto headlight bulb is connected through a 2 ohm rheostat to the 6.3 v. 2 amp. wires of Jefferson power transformer #463-381. A plano-convex lens of short focal length is used to throw the image of the bulb, which is placed with one filament coil directly behind the other, on a field diaphragm. Microscope mirror and condenser are adjusted to bring this image to a focus on the object lying in the plane of focus of the microscope.

The microscope field of 4 and 2mm. objectives will be uniformly illuminated if the image of the bulb filament on the field diaphragm is slightly wider than the diaphragm opening, which should be about $\frac{1}{4}$ inch in diameter. A ground glass is inserted under the condenser with 16 and 8 mm. objectives.

One or more thicknesses of blue, green, or yellow cellophane can be used as an inexpensive filter for this light.

A PHYSIOLOGICAL STUDY OF PLATELETS, MEGAKARYOCYTES, AND THROMBOCYTES.

—John H. Ferguson, School of Medicine, University of Alabama.

The 'alterations' in mammalian platelets in citrated and clotting blood have been described in a previous publication (Ferguson: *Amer. J. Physiol.*, 1934: 108: 670). The experimental data support the view that the platelets yield an essential factor for coagulation by means of a peculiar type of osmotic imbibition and partial plasmolysis under the control of (a) 'wetting' factors, (b) a specific effect of calcium ions, and probably, (c) the cell-lipids. Simple lysis is insufficient to initiate clotting in the presence of decalcifying and other anti-coagulants.

The bone-marrow giant cells (megakarocytes and polykaryocytes) were studied in the living condition with respect to the following functions (i) motility (ii) phagocytic activity (iii) lytic phenomena. The last were shown to be very similar to platelet alterations.

Embryonic (early) rabbit blood revealed numerous tiny nucleated cells (and no platelets). These showed similar lytic phenomena and relations to the coagulation processes.

The thrombocytes of (a) frog (b) sun-fish (c) turtle (d) fowl performed their clotting functions in essentially the same manner except that the characteristic lysis was more 'explosive' in character.

The chief conclusions from these observations is that the elements studied all evince a lability to the specific lytic factors cited, quantitatively different from the lysis of other cellular and tissue elements.

The rabbit embryo data support a number of observations in the literature which tend to link platelets with red cell precursors. Our comparative data are not in conflict with Howell's recent view. Further confirmation is necessary.

STUDIES OF THE SOMATIC MITOTIC CYCLE IN THE GRASSHOPPER.

—J. Gordon Carlson, University of Alabama.

The large neuroblasts arranged in longitudinal rows in the mid-ventral region of the young embryo give rise dorsally by successive unequal divisions to rows of small ganglion cells, which develop into the ventral nerve cord of the adult. Cytological study reveals the following:

1) The neuroblast nucleus consists of several elongate chromosome vesicles or karyomeres, slightly divergent and free distally but fused and intercommunicating in a circle proximally. A central cytoplasmic core thus occupies the position of the main axis of the nucleus. Because of proximal fusion the term "lobed nucleus" may be preferable to "karyomeres." Each lobe contains the distal portions of one or more chromosomes.

2) Neuroblast metaphases show the same chromosome complements as do those of spermatogonial cells of the same species. The multiple chromosomes that are known from the germ cells of *Chorthippus* and *Chloealtis* are present also as permanent associations in somatic cells.

3) Secondary constrictions characterize certain chromosomes during neuroblast prophases, metaphases, and anaphases, and are constant for the individual. Such constrictions have not been observed in spermatogonial chromosomes.

4) Anaphase figures indicate that the distal separation of chromatids is an autonomous act of the chromosome and not the result of forces exerted at the spindle attachment region.

5) The ganglion cells probably never divide after their formation. At telophase, when they arise, their chromosomes are at first clumped, but later break up into anastomosing masses that gradually become lighter staining.

THE VAGUS NERVE DISTAL TO THE NODOSE GANGLION OF THE CAT.

—James O. Foley, University of Alabama.

Transverse sections of the normal vagus nerve distal to the nodose ganglion prepared by various refined silver techniques demonstrate black dots so fine that they defy enumeration by ordinary methods. Since similar dots are seen in nerves from which efferent fibers have been eliminated, it is believed that they have some relation with sensory fibers. Surprisingly, these minute elements are much smaller than the smallest unmyelinated fibers previously observed in the vagus proximal to the nodose ganglion, an observation at variance with the well-known fact that peripheral processes from cells of a sensory ganglion are larger than central processes. Accordingly, they must be artifacts, supporting tissues, neurofibrillae or branches of axons. Because of their appearance, distribution and arrangement, the last interpretation is tentatively favored and if such proves to be true, the number of fibers in the vagus distal to the nodose ganglion exceeds that proximal by a far greater margin than has hitherto been suggested or anticipated.

THE JUGULAR FIBERS IN THE VAGUS NERVE OF THE CAT.

—Franklin S. Dubois, University of Alabama.

In a previous report (DuBois and Foley, 1936 meeting) based on studies made by the chromatolytic method, it was suggested that relatively few of the fibers with cell bodies in the jugular ganglion descend in the cervical trunk of the vagus and that the majority are distributed via the auricular nerve. Additional evidence in support of this view is submitted.

The vagus nerve was sectioned and subsequently the nodose ganglion was removed in six cats. It was hoped that following such procedures the number of cells in the jugular ganglion might be compared with the number of peripheral processes but regeneration in the segment of vagus distal to the ganglion and technical difficulties made some of the material unsatisfactory for numerical analysis. In one animal, there were 8451 cells in the jugular ganglion, 6237 fibers in the auricular nerve and 1298 fibers in the vagal stump. In another, the auricular nerve could not be analyzed but in the vagus 4105 axons were counted; however, some of these may have been the product of regeneration. Although enumeration of the axons in the remaining vagus nerves was impossible, osmicated preparations demonstrated 324, 350, 456 and 633 myelin sheaths, respectively. Additional auricular nerves (some from the above animals, others previously prepared) were studied. The axon counts were 6533, 8154, 9121, 9371 and 10928, respectively.

SECTION II

CHEMISTRY, PHYSICS AND MATHEMATICS

DERIVATIVES OF 6-AMINOQUINOLINE.

—George W. Hargreaves and O. Bostick, Alabama Polytechnic Institute, Auburn.

In the preparation of 6-nitroquinoline from p-nitroaniline by the Skraup reaction using arsenic acid as oxidizing agent it has been found that a better yield is obtained and that the resulting product is easier to purify if the time of refluxing is decreased. Details are given of the reduction to 6-aminoquinoline by means of stannous chloride. Other methods of reduction are described and discussed. Oxidation of the aminoquinoline to the ortho-quinone in a manner similar to that used with the corresponding hydroxy compound has been unsuccessful. 6-Aminoquinoline is readily diazotized forming a comparatively stable diazo compound. The diazo compound has been coupled with o- and p-toluidine, betanaphthol and 6-hydroxyquinoline forming red azo compounds which are described. 6-Aminoquinoline combines with quinoline-o-quinone in manner analogous to aniline.

SOME CONFORMAL MAPPING IN CONNECTION WITH THE TRANSFORMATION $W=COT Z$.

—Jane Lee Evans, University of Alabama.

The paper deals with the geometry obtained by mapping parallel lines $x=a$, $y=b$ upon the w-plane by means of the transformation $w=cot z$.

THE ELECTROLYTIC REDUCTION OF ANTHRANILIC ACID TO 2-AMINO BENZYL ALCOHOL.

—Roger W. Allen and Homer Carlovitz, Alabama Polytechnic Institute, Auburn.

2-Aminobenzyl alcohol, m. 83.5°C., is obtained in good yield by the electrolytic reduction of an acidified solution of anthranilic acid, m. 145°C. A lead cathode is employed. The procedure, a description of the set-up and optimum conditions of current density, temperature and time are given.

THE ENVELOPE OF THE SYSTEM OF CIRCLES WHICH ARISE BY INVERTING IN THE UNIT CIRCLE THE LINES OF A FIXED CONIC.

—Emerson Ward Blakney, University of Alabama.

This problem arose as a modification and extension of a problem proposed in the *American Mathematical Monthly*, vol. 33, p. 47. A solution is given in vol. 34, p. 48, by W. L. Ayres of the University of Pennsylvania.

The method employed here is entirely different from that given in the monthly. The conic and the unit circle are taken in line form, and the system of inverse circles containing two parameters is found. The envelope which is a unicursal quartic is found by the usual process. The path of centers of the inverse circles is also obtained.

A NEW METHOD OF DETERMINING THE FUNDAMENTAL UNIT OF A REAL QUADRATIC FIELD.

—Paul M. Hummel, University of Alabama.

Every real quadratic field has infinitely many units. One of these, called the fundamental unit, has the property that every other unit may be expressed as plus or minus some power (positive, negative, or zero) of it. The determination of the fundamental unit requires the solving of the appropriate indeterminate equations, and thus there is a certain amount of trial and error involved in the usual methods. This paper describes a method of determining the fundamental unit which is entirely free of tentative procedure.

HARD SURFACING OF STEEL BY A DIPPING PROCESS.

—C. A. Basore and Dan T. Jones, Alabama Polytechnic Institute, Auburn.

Ordinarily worn metal parts or new metal parts to be protected against wear are hard surfaced by suitable hard surfacing welding rods applied by means of oxy-acetylene or electrically.

A new hard surfacing rod has been developed which is very inexpensive, requires less amperage than most rods of the same diameter, and eliminates some of the difficulties involved in the application of the hard surface. That is, since the rod is self-fluxing, cleaning or polishing of the base metal to remove rust is unnecessary.

Recently a process has been developed which requires no rod whatever. The article to be surfaced is dipped momentarily under certain definite conditions in a molten alloy steel of the required composition.

The equipment for this work has consisted of a barrel furnace some three feet in diameter and a graphite-clay crucible. Plow points or similar articles six inches wide have been surfaced in this way. The thickness of the coating can be varied at will from perhaps one thirty-second of an inch to an eighth of an inch. The hardness of the coating when air cooled is from 400 to 450 Brinnell, and when quenched in water, from 600 to 650 Brinnell. The coating is often a chromium-manganese alloy steel, but the composition can be varied over a considerable range.

Results indicate that plow points surfaced in this way have a resistance to wear fully three to five times that of the unsurfaced points.

The major advantages are: the exceptionally low cost of materials, and, that the process apparently lends itself to mass production.

THE HYDROLYSIS OF LIGNIN.

—Kenneth Coons and Frank Schellenberg, University of Alabama.

Treatment of precipitated lignin at near the critical temperature of water, without catalyst, resulted in the formation of oils which could be fractionated by distillation, differential solvation and precipitation, and a residual tar.

The lignin was obtained by precipitation of black liquor from the Kraft process. A water lignin mixture was autoclaved with agitation. The reaction temperatures ran from 200-400 degrees C., pressures from 300 to 5,000 lb./sq. in., and times of reaction from three to ten hours. Best results were obtained with temperatures of from 240 to 260 degrees C., reaction periods of 3 to 4 hrs. and at a pressure of about 1,000 lbs. per sq. in. A typical run at these conditions gave a yield of 4g. of water immisible oils and 13g. of tar, from 30g. of lignin. The tar oil mixture was separated from adhering carbonaceous material by ether extraction. Fractionation of the ether extract yielded two definite fractions, one boiling at 108 to 109 degrees C., the other between 126 and 132 degrees centigrade. Both these oils displayed phenolic properties, but peculiarly enough would not readily steam distill.

A STUDY OF NICKEL CATALYSTS.—II.

—Kenneth Coons, University of Alabama.

The role of activating agents in catalyst preparation was studied by means of examination of the crystal lattice structure with the powder x-ray apparatus. Copper activated catalysts may be reduced in a current of hydrogen at 210°C. for 30 minutes. This treatment gives a product with maximum catalytic properties. When examined by the above method the crystal size was found to be too small for resolution of the x-ray beam. By heat treatment of the catalyst at 400°C. for ten hours the crystal size may be so increased as to give resolution. However the heat treated materials have no catalytic activity. The diffraction lines of the heat treated catalyst show the presence of metallic nickel and a nickel copper alloy.

These results indicate that there is a direct relation between the catalytic activity of nickel catalyzers and the crystal size of the catalyst. It is possible to postulate from these results that strains within the crystal structure have a role in the activity of the catalyst.

PEDAL CURVES.

—Aaron A. Abston, University of Alabama.

In this paper we treat a general method of finding the first positive pedal curve of any curve with the pedal origin taken at the polar origin of the given curve. We have derived a transformation which enables us to write the pedal with respect to any other point as the pedal origin. In addition we have a general method of writing the negative pedal of a given pedal curve. The work is amply illustrated with examples.

TWENTIETH CENTURY PHLOGISTIANS.

—Jack P. Montgomery, University of Alabama.

The Phlogiston Theory was of great value in the 18th Century. Important contributions to chemistry were made by the disciples of the theory. This theory passed away very largely as the result of discoveries made by the phlogistians themselves. Some modern theories are considered as somewhat parallel.

A PROBABILITY TEST OF RANDOM COUNTS FROM GEIGER-MULLER COUNTERS

—Eric Rodgers, University of Alabama.

To a person just beginning to use Geiger-Muller counters, it seems that much too often relatively long periods of time pass without a count; or, what is more disconcerting, the counts often appear to be coming in groups of two or more very close together. The frequent occurrence of these "multiple" counts caused the writer to make the test described below.

The number of counts per 15 second interval was recorded for 2882 separate intervals. The count ranged from 0 to 11 per interval and the average per interval was 3.83. The table shows

Count per interval.....	0	1	2	3	4	5	6	7	8	9	10	11
Frequency of count.....	62	238	454	589	578	414	269	158	70	35	12	3
Predicted frequency.....	62	238	459	586	561	430	274	151	72	31	12	4

how many times each count occurred and also shows the number of times each count should have occurred if the counts were taking place at perfect random. The predicted values were computed from a probability formula due to Poisson. It is seen that the predicted and observed values agree as closely as could be expected for such a small number of trials. The difficulty with the beginner is probably due to the fact that the mind has no conception of what constitutes perfect randomness.

THE COMPOSITION OF A NEW SERIES OF SULFUR DYES.

—G. D. Palmer and S. J. Lloyd, University of Alabama.

Preparation of a new series of sulfur dyes by contact of molten sulfur with the vapors of organic compounds has been previously reported. *J. Am. Chem. Soc.* 52. 3388 (1930) These substances have been purified by extraction with representative solvents and analyzed for carbon, hydrogen and sulfur. A constancy in empirical formulas has been obtained.

TORNADOES, WITH PARTICULAR REFERENCE TO SUCH DISTURBANCES OCCURRING IN ALABAMA.

—Patrick H. Smyth, Montgomery.

Their frequency, meteorological conditions favorable for their origin and development; destructive vorticular whirling, low pressure within the vortex, attendant funnel-shaped cloud, progression, time of occurrence, incredible freaks.

THE VITAMIN B AND VITAMIN C CONTENT OF THE ACORNS OF QUERCUS NIGRA.

—Anna E. Church, University of Alabama.

Since acorns of the Black Oak Group had been found to be good sources of carotene, it was thought of interest to extend the nutritional study to include assays of the vitamin B and vitamin C content of these acorns. The acorns of *Quercus nigra* being representative of the water oak subgroup of the Black Oaks, and having a high carotene content were chosen for preliminary determinations of these vitamins.

The vitamin B assay was carried out by the method of Chase and Sherman. Expressing the results in terms of Sherman units it was found that the acorns of *Quercus nigra* contain approximately 6 units per gram (dry weight). This value falls between that of wheat and wheat germ as a source of vitamin B, both being considered excellent sources of this vitamin.

The vitamin C content has been studied both by the biological method and by a modification of the Bessey and King titration procedure. The biological assay as outlined by Sherman and coworkers was used. Considering 1 guinea pig unit equivalent to 0.5 mg.-l-ascorbic acid, the kernels of the *Quercus nigra* acorns contain about 0.4 mg. vitamin C per gram acorn (dry weight). The titration values are slightly above this falling between 0.6 and 0.7 mg. These values approach those of lemon juice as a source of vitamin C.

SECTION III
GEOLOGY, ANTHROPOLOGY AND ARCHEOLOGY
 A REPORT ON THE GEOLOGY OF CHEHAW STATE PARK,
 GEORGIA SP-9, AND VICINITY.

—Robert H. Griffin, University of Alabama.

This report treats the areal geology of an area immediately north of the city of Albany in southeast Georgia, lying within the Coastal Plain.

The topography is gently rolling to level with an average elevation of about 200'. Occasional sink holes occur.

The area is underlain by the Ocala limestone of upper Eocene age. In this area the formation is nearly horizontal, dipping to the southeast about 15' per mile. No faulting or folding was observed. In the Chehaw Park area the Ocala formation is composed largely of white to cream-colored soft, friable limestone containing some hard, partly crystalline concretions. The limestone outcrops only along streams, being covered elsewhere by terrace deposits probably of Pleistocene age, or recent sands and alluvium, or by its own weathered products. Above the limestone are irregular deposits of coarse red sands and gravels containing much disseminated clay flint and jasper fragments and some limonite concretions which occur as terraces 10' 25" thick along Flint River. The freshly exposed product of decomposition is a bluish gray, very tenacious clay. Large boulders of porous flint and jasper occur along the streams. The limestone is partly silicified in places, containing flint replacements and silica segregations.

An abundance of well preserved Eocene fossils is found in the limestone.

HOLOTHURIAN REMAINS FROM THE MIDWAY OF ALABAMA.

—Winnie McGlamery, Geological Survey of Alabama, University.

Holothurian fragments in the form of microscopic spicules and plates, which may be near the genus *Synapta*, were found at the following Midway localities in collections made during 1935 and 1936:

1. Twenty-nine miles south of Selma, Dallas County, Ala., road to Oak Hill, strata in road cut.
2. Twelve miles north of Camden, highway to Selma, road cut; just west of locality No. 1.
3. One and one-half miles west of Prairie Bluff, Alabama River, Ala., road to Prairie, in ditch. This exposure carries a Foraminiferal fauna characteristic of the lower Midway or Kincaid formation of Texas.

IRON ORE AVAILABLE TO ALABAMA BLAST FURNACES.

—Ernest F. Burchard, U. S. Geological Survey, Washington, D. C.

In Alabama the anhydrous ferric oxide, hematite, and the hydrous ferric oxide, commonly called limonite, are found in abundance; iron carbonate, siderite, in less than commercial quantities, and the magnetic oxide, magnetite, only rarely. The hematite and limonite are

found in somewhat different forms according to their geologic environment.

The Red Mountain hematite, of Silurian age that crops out in well-defined beds for 150 miles northeast-southwest and 40 miles northwest-southeast is the predominant source of ore. Only a small part of this area carries ore of commercial value; Birmingham and Gadsden are now the only centers of production. The ore is of sedimentary origin, probably altered from vast deposits of greens and mixed with calcareous, fossiliferous, marine debris. Other types of hematite not yet mined commercially are in metamorphosed rocks in Columbiana Mountain and quartzite in the Talladega Hills.

Limonite (brown ore) is widely distributed geographically and geologically. In northeast Alabama it occurs in Cambrian Weisner quartzite in proximity to faults and is derived from iron pyrites in places. This ore occurs also in a belt trending northeast through 5 or 6 Counties in scattered deposits replacing slate and schist. Pyrite, in places, may indicate a source for the ore.

In other widely separated places such as the Russellville District, the Birmingham Valley, Shelby County, and Southern Alabama, brown ore occurs in irregular masses in unconsolidated clays, sands, and gravels of Upper Cretaceous to Recent age that overlie dolomite and limestone in Cambrian, Ordovician, Mississippian, and Tertiary age, and have been formed by replacement of clay and sand by downward circulating waters that derived iron from ferruginous deposits (probably greensand) that formerly overlay the areas.

Lantern slides were presented outlining by maps, tables, and photographs the kinds of ore, their geographic and geologic distribution and their general characteristics.

LONGEVITY IN THE TENNESSEE VALLEY.

—Roland M. Harper, Geological Survey of Alabama, University.

Records of nearly 2,000 tombstones in three Tennessee Valley counties (plotted on a graph which was exhibited) seem to show that before the Civil War the average age at death of white people living on the red clay lands derived from the Tuscumbia limestone was less than 30 years, as compared with about 55 at the present time. Males seem to have lived a little longer than females up to about 1900. For adults only, the apparent average longevity ranged from about 45 years a century ago to 63 now; and married adults live longer than the unmarried, for various reasons, the chief of which is perhaps that persons in poor health are less likely to marry than others.

Records of over 1,000 deaths in Madison County in two recent years, taken from the files of the county health department, have been classified according to residence of the deceased. White people had an average longevity of 44 years in Huntsville, 36.2 in its manufacturing suburbs, 43.4 in the mountainous eastern half of the county, 32.3 in the red lands (Tuscumbia limestone), and 31.3 in the chert barrens (Lauderdale chert). The averages for negroes were not very different. For married adults in the whole county the averages were 59.7 for whites and 56.4 for negroes, for single adults 47.7 and 41.1, all adults 59.0 and 54.6, and all ages 38.1 and 39.9. White females lived about

two years longer than white males, and negro females about five years longer than negro males.

The tombstone records give higher averages than the office records, which may indicate that the graves of children are less completely marked than those of adults. But the average age at death, determined in this way, is not necessarily the same as the expectation of life, determined by actuarial methods.

NEGLECTED FACTORS IN THE STUDY OF ANCIENT SEDIMENTS.

—R. S. Poor, Birmingham-Southern College.

This paper called attention to two groups of factors which have been seriously neglected in the study of ancient sediments, pointed out the application of certain of these factors and outlined briefly the present status of each technique in the equipment of the modern stratigrapher.

The following factors were considered briefly: Group I, Physical —paleogeology as a valuable adjunct to the familiar paleogeography. The Paleogeologic map as devised by Levorsen is drawn on data obtained from any well-known unconformity and shows the distribution and structure of all rocks along the surface of unconformity prior to the succeeding cycle of sedimentation. The value of such a map is comparable to the value of an areal geologic map of present surfaces. In this group, attention was also called to the serious lack of study on the mineralogy of sedimentary rocks.

In Group II, Such neglected organic factors as paleoecology and symbiotic relationships of organisms were described. Emphasis was placed upon the need for further study along the lines started by the Committee on Paleoecology of the National Research Council. Several pitfalls in the interpretation of sediments as pointed out by this committee in their 1936 report were called to the attention of the section.

PETROLEUM POSSIBILITIES IN ALABAMA.

—Joseph J. Graham, University of Alabama.

The potentially petroliferous areas of Alabama are discussed with special emphasis upon the significance of recent geophysical exploration work and drilling operations in the Gulf Coast Province.

THE IMPORTANCE OF REFLECTION WAVES IN SEISMOLOGY AND GEOLOGY.

—A. J. Westland, S. J., St. Louis University.

By the study of the reflection waves of shallow earthquakes and blasts, the seismologist discovers the various outer layers of the earth's crust and their thickness. These same waves along with velocity changes, point to major and minor discontinuities and an inner core. The reflected phases of deep earthquakes determine just how much beneath the surface, be it 100km or 700km, the energy release occurred and from the knowledge doubts arise regarding the accuracy

of present theories of mountain building, isostasy and strength of rocks. Reflection of waves enables the geologist to determine the depth of ice and snow in arctic regions, to measure the thickness of sediments on the continental shelf and to investigate the mechanism of overthrusting by accurate knowledge of the shape of fault surfaces and size of faulted blocks. With the Reflection Seismograph the geophysicist outlines buried mountain ranges, traces water-bearing formations and exactly locates salt domes and oil sands.

A TALLAPOOSA BIRD CONCEPT.

—Peter A. Brannon, Department of Archives and History, Montgomery.

Illustrating with slides a series of drawings showing designs and shapes of a characteristic concept from the Tallapoosa River, the speaker called attention to the striking fact that the so-called Boat-pipes of the middle Alabama Indians were bird effigies, rather than "Boats." The eye, the bill or head, sometimes the talons and a nodular protrusion are invariably used in the execution of what was without doubt a conventional concept. These nodules or protrusions are equally as often inverted as regularly placed. That nodular object is more like the human breast than any other description.

Previous investigators, archaeologists in that field, have called a design evident there, the ivory billed Woodpecker. It was clearly demonstrated that this is a figure of a human, and the bill, always extending beyond the outside of the design is actually the protruding tongue of this figure. He is represented always as squatting or kneeling. The figure is strikingly like the Mexican figure depicting perhaps one of the deities of that culture. That squatting object illustrating the thrusting of a sword up through the tongue, is found at the head waters of the Alabama, depicted on shell gorgets which occur in contact with these bird effigies.

STUDIES OF THIN SECTIONS OF THE BLUE CREEK COAL SEAM.

—C. S. Blair, Black Diamond Coal Mining Co., Birmingham.

The paper was a digest of an article written by Dr. Reinhardt Thiessen of the U. S. Bureau of Mines which concerned the so-called "blue band" of the Blue Creek seam, which band occurs throughout the field and serves as a handicap to mining in the form of a middle man. Several slides showing micro-photographs of the Blue Creek "blue band" were shown and it was concluded that the "blue band" was caused by minute nodules of siderite (FeCO_3). Numerous other details were described showing the character of the elaborate analysis made by Dr. Thiessen.

A MOVIE: TEMPLES AND PEACE.

—Walter B. Jones, State Geologist of Alabama, University.

Sound movie, 16 mm, 2 reels, portraying the Moundville Culture. Directed by Randall M. White, photographed by Paul Wilkerson, and under the supervision of Fanning Hearon, Chief, Motion Picture Division, National Park Service, this interpretation is based upon substantial facts. The migration of the early peoples are shown; then the building of the great metropolis at Moundville; homes, temples and everyday lives; pottery making, stone work, copper, shell and bone craftsmanship; and above all the absence of war-like implements. The final record is the work of restoration and preservation of the area, together with necessary construction, through the Civilian Conservation Corps.

GEOLOGICAL AND ANTHROPOLOGICAL FIELD TRIP,
SECTION III.

—Walter B. Jones, State Geologist of Alabama, University.

The party left the Chemistry building in automobiles, and had several good views of the University terrace of the Warrior River, and exposures of sand and gravel of the Tuscaloosa (upper Cretaceous) formation. The University terrace is about 50 feet above the Northport terrace, upon which the mounds are built.

An hour was spent at Mound Park, seeing the mounds and surrounding area. There are 34 mounds in the group, 18 of which form a hollow square. The largest is Mound B, which is 58.5 feet high, covers 1/4 acres, and contains more than 111,000 cubic yards of earth. Upon the mounds were constructed temples, the remains of which are still visible. The people lived in the area around the mounds, and buried their dead underneath the floor of the houses. With the dead were placed various articles of a personal nature, such as beads, pottery, stone, implements, paint, copper, bone, etc.

A half hour was spent in the temporary burial museum, which is soon to be supplanted by a permanent, fire-proof structure within the park. The National Park Service has already approved the plans for the new building and appropriated funds therefor, construction work to start at once.

The party then proceeded to Havana, in Hale County, where the celebrated gullies, carved out of the Tuscaloosa sands and variegated clays, were studied. The gullies are about 60 to 75 feet deep and show beautifully, the character of the Tuscaloosa formation.

SECTION IV

INDUSTRY, ECONOMICS AND GEOGRAPHY

AIR MASS ANALYSIS AND WINTER WEATHER IN ALABAMA.

—J. Allen Tower, Birmingham-Southern College.

The Polar Front theory of air mass analysis was developed in Norway during the war. This technique of weather forecasting was first applied in this country by the air lines which found the old two-dimensional method inadequate. The U. S. Weather Bureau began to use the new technique in 1933.

Of the seven major types of air masses recognized as affecting the United States, two dominate Alabama winter weather. These are the Tropical Gulf and Polar Continental air masses. Polar Continental air obtains its special characteristics in Alaska, northern Canada, and the Arctic. The winter surface cover of snow and ice, plus scant insolation, results in low temperatures, very low moisture content, and marked stability. By the time this Polar Continental air has moved south to Alabama, its characteristics are modified; the lower levels are warmer and have acquired more moisture.

Tropical Gulf air obtains its special characteristics over the Gulf of Mexico and the Caribbean Sea. As a result of the uniform warmth of the waters, the air over it develops marked warmth and high moisture content in its lower levels. As this air mass advances northward over Alabama it is marked by temperatures high for the season, high humidity and much nocturnal cloudiness. A temperature inversion is common.

The sudden alterations in temperature and humidity when the wind changes from a southerly direction to a northerly one are the result of the replacement of warm moist Tropical Gulf air by cold, dry Polar Continental air. The extreme contrasts in our winter weather result from the alternate importation of tropical and polar air masses.

ALABAMA'S WET AND DRY COUNTIES COMPARED.

—Roland M. Harper, Geological Survey of Alabama, University.

There are 15 counties in Alabama that voted against prohibition in each of the three elections on the question in the last four years, and several others that voted that way once or twice. Statistics from the United States census and the State Board of Health show that the 15 "wettest" counties differ from the rest of the state in several important particulars; and similar conditions have been found in several other states.

The "wet" counties have a much larger urban population, less illiteracy, and more radios, and are evidently the most prosperous. But they also have smaller families, a lower birth-rate, higher death rate and infant and maternal mortality rates, and proportionately about twice as many divorces and suicides as the drier counties.

However, there is nothing in the figures to indicate that any more liquor is consumed in the counties that oppose prohibition than in the others, or if there is, that that is the cause of the differences indicated. It is more likely that the smaller families make a larger proportion of

spoiled children, who when they grow up are impatient of legal restrictions. And many people who are below par physically (as indicated by the higher death rate, etc.) may desire to drink to forget their troubles.

SOME CONDITIONS OF AGRICULTURE IN THE GREAT APPALACHIAN VALLEY OF ALABAMA

—J. Frank Glazner, State Teachers' College, Jacksonville.

The Great Appalachian Valley of Alabama includes that part of the state lying between the plateaus on the northwest and the Piedmont Plateau on the southeast. It includes the Coosa Valley and a number of other important valleys. It is about 130 miles long and from 25 to 40 miles broad, an area of approximately 4200 square miles.

Climatic conditions of the valley are favorable to agriculture. There is a long growing season and abundant rainfall, the average being 53.3 inches. The total value of all farm products in 1929 was \$20,854,233. Jefferson County led with a value of \$4,009,993; Cherokee County was second, and Etowah third. Cotton is the chief crop of the valley; it exceeds corn by about 20,000 in acres and \$7,281,000 in value. The average size farm is 70.2 acres. The average value of farm land in Jefferson County is \$89.40 per acre, while in rural Cherokee County the average value is \$31.61.

Agriculture was long the foremost activity of the Great Valley, but it has been superseded by manufacturing which now employs more people. The value added by manufacturing is seven times the total value of agricultural products. In many sections of the valley the cultural features of homes, barns, fences and fields indicate a decadent agriculture. The percentage of mortgaged and tenant farms is high. Accurate data are lacking, but those counties having the highest percentage of tenancy likewise have the highest percentage of illiteracy.

EMPLOYMENT AND PERSONNEL ADMINISTRATION IN THE FIELD OF INDUSTRIAL RELATIONS

—J. P. McClendon, Stockham Pipe Fittings Co., Birmingham.

It has been said that, "A great business is the extension of a personality."

So the employment service of today is an extension of the personalities of those who have had administrative responsibility and gave of their best to build an adequate organization for employment service.

The Director of Personnel is an important executive, assisting in the formulating of company policies and promoting them through the Line Executives to the workers. The characteristics of the successful Personnel Manager indicate he must be a man of versatile attainments.

The development of a wholesome personnel situation within a company involves: (i) Wisely promulgated policies, (ii) The proper interpretation and transmission of these policies by the Personnel Manager to the Line Executives, and (iii) Success on the part of the Line Executives in fulfilling their obligations to management and to workers by making these policies effective among their workers by thorough-going leadership.

The fully developed program of the employment department greatly aids in the attaining of the desired high plane of morale among the employees.

The routine of establishing contacts with sources of labor supply, arranging the personal interview, submitting the applicant to special tests, then the checking of applicants' qualifications against job and worker specifications enables the employment manager to more accurately select the correct applicant for the work at hand.

WHAT DO THE INDUSTRIES EXPECT OF THE COLLEGES?

—John Xan, Howard College, Birmingham.

The industries look to the colleges for two things:

1.—a certain type of graduate, and 2.—cultural assistance from the faculty.

1. The ideal candidate for a position in the industries is a man outstanding in grades, as well as college activities. A good foundation in English, especially speaking, writing and spelling, is imperative. He must have good ground-work in simple mathematics, and a liberal arts background, including such subjects as economics, practical psychology, sociology, history, literature, management of labor and even Bible. As to technical training, ground-work in chemistry, physics, and some of the industrial processes are desirable, but the industrialists prefer to teach their own specific processes. The candidate must understand human nature and know how to control men. He must have a studious and inquiring mind and must, of course, have good health.

The industrial employee must be able to get along with all classes of people and have respect for the worth of the individual. Honesty, dependability, resourcefulness, accuracy, self-control, power of discrimination and judgment and a pleasing personality are all desirable characteristics.

His education should be regarded merely as a tool which enables him to learn faster from superiors as well as inferiors. He must enter with a humble spirit and learn the system before he criticizes it.

2. Cultural assistance from the faculty: The executives believe that the colleges should furnish cultural education in non-technical subjects, in the form of lectures and conferences. The faculty should show a willingness to co-operate in specific problems requiring very expert knowledge in such fields as higher mathematics or the translation of foreign articles, etc.

KEEPING THE MAN ON THE JOB

—Percy H. Woodall, M.D., D.O., Birmingham.

It must be recognized by both employer and employee that man is himself an animate machine. He is subject to mechanical strains and stresses. These should be avoided. They cause many disabilities and are best treated by first putting the body machine in mechanical order.

Many diseases formerly requiring hospitalization and loss of time are now successfully treated by "Ambulant Methods." These methods require no loss of time, and allow the patient to be "up and about"—on the job during the course of treatment.

Prominent among these diseases is hernia or rupture. The same, or, as claimed by some, better results are secured by injection than by the ordinary surgical operation; and this too without hospitalization or loss of time. This treatment is now the treatment of choice by many railroad and industrial surgeons, as well as a large number of hospitals.

Ano-rectal diseases lend themselves readily to non-confining treatment. Hemorrhoids, particularly, are treated without disability or lying up, without an anesthetic of any kind, with much less pain, less expense, and with fewer complications than from any of the surgical operations.

In the majority of other ano-rectal diseases the loss of time and expense can be greatly reduced by ambulant treatment.

These means of decreasing labor turnover to employer, and expense to employee are suggested to industry for investigation and adoption.

MOBILE: A STUDY IN URBANISTICS

—Floyd F. Cunningham, State Teachers College, Florence.

Urbanistics is that science which deals with the growth of cities. It deals not only with the elements of fixation of cities but also with the factors which have contributed and are contributing to urban growth and development or may contribute to urban growth and development.

The urban community of Mobile is an example of a commercial node because of its coastal position, its good harbor, its location at the terminal of a great ocean route, and its gateway access to a well-developed hinterland. Mobile has thus become the performer of certain nodal functions, and as a result of the performance of these functions, it has grown to a city of almost 75,000 people.

The growth of Mobile is due in no small part to its excellent harbor and its harbor facilities. These facilities are adjuncts and not causes, but, nevertheless, they are factors affecting the flow of commerce. The city is well served by railroads which radiate fanwise from the city and the port has excellent inland waterway connections by way of the Warrior-Tombigbee River system.

Mobile has an advantageous position as a world seaport, situated, as it is, on the Gulf of Mexico at the mouth of an important river system which drains the territory rich in coal, iron and other minerals, and which is also of great agricultural importance. The lands of low latitudes are becoming of increasing importance and Mobile's interstitial position between these lands and those of mid-latitudes should assure it of some future development.

By virtue of its position relative to producing and consuming regions Mobile handles a great variety of products. The export trade consists chiefly of pine and hardwood timber, lumber and logs, cotton and cotton seed products, iron and steel products, non-metallic minerals, particularly bunker coal and bunker oil, flour and rosin and turpentine. The principal imports are vegetable food products (bananas, sugar, corn, oats, molasses, etc.), chemicals and ores and newsprint paper.

EXPERIMENTS ON THE RAPID REDUCTION OF POWDERED IRON ORE TO A MOLTEN PRODUCT

—Ray L. Farabee and Elwyn Archibald, University of Alabama.

This process consists of blowing finely divided ore or ore concentrates, along with a predetermined quantity of powdered coal to act as a reducing agent and powdered lime to serve as a flux, into a furnace of strongly reducing atmosphere, the operation being similar to firing powdered coal. The finely divided ferric oxide coming into intimate contact with the reducing gases and the finely divided reducing agent at elevated temperatures causes a very rapid reduction of the ferric oxide, while the flux combines with the silica and alumina, forming a slag. If this operation is carried on at temperatures in the neighborhood of 1450° C., the resulting products of iron (steel?) and slag will be in a molten condition and will settle into the crucible of the furnace, from which it can be tapped. The iron product can be classified as a very low carbon iron, carrying smaller percentages of certain impurities than iron produced in the iron blast furnace. Phosphorus, the majority of which goes out by the gas route, and silicon are extremely low. By controlling the amount of excess reducing agent, a product of high carbon steel nature can be made. The advantages of the process are: Sintering of the concentrates and coking of the coal are unnecessary. A low phosphorus iron is made, and the operation is rapid.

SOME OBSERVATIONS ON SHRINKAGE IN CUPOLA MALLEABLE IRON

—F. B. Riggan and R. F. Frings, Stockham Pipe Fittings Co., Birmingham.

A study of the formation of porous spots during solidification of cupola malleable iron. The mechanics involved in the formation of internal voids are considered. Effects of varying carbon and silicon content on shrinkage are given, together with data on the freezing range of malleable iron. The structure of castings influenced by cooling rate and wall thickness is discussed.

SOME SUGGESTIONS ON VOCATIONAL GUIDANCE

—S. D. Moxley, American Cast Iron Pipe Co., Birmingham.

Seldom can a man of great achievements properly appraise the characteristics and qualities that made his success possible. The complexities of the human machine are exceeded only by the complex social and economic environment in which we must operate—and this because the environment is composed of many human beings. That is why vocational guidance is so difficult to reduce to anything approaching an exact science. Psychology is an important factor in this field, and psychology is not in itself an exact science.

However, there are on record many splendid attempts to record and segregate into definable terms some of the characteristics, likes and dislikes, trends and talents that indicate in broad terms the field of work to which one might be best suited. Any study must go far beyond the usual questionnaire, and should be checked closely by several intimate associates of the person under examination. Conferences

between these associates and the investigator will greatly assist in more accurate interpretation of data compiled. Close attention to this phase followed by a relatively short period of guidance by the trial and error method should produce vastly improved results.

It seems to the writer that the system used by Harry Newton Clarke of Cleveland, Ohio, if applied during the last year in high school and with the assistance of instructors, would be very helpful. This record along with health data and supplemented by conferences would be invaluable to the counselor and to industry in guiding a youth into a career.

ALABAMA JUNIOR ACADEMY OF SCIENCE

Program of Fifth Annual Meeting, April 2 and 3, 1937

President, Dorothy Burke Murphy High School, Mobile
Vice-President, Tommy Long Woodlawn High School, Birmingham
Secretary, Catherine McDonald Convent of Mercy Academy, Mobile
Treasurer, Genevieve McLure Visitation Academy, Mobile

Friday, April 2, 1937

- 1:30 P.M.—Registration at Smith Hall. Arrangement of exhibits
 2:30 P.M.—Business meeting. Sheffield High School was admitted as a member of the Junior Academy
 3:15 P.M.—Presentation of Papers
 8:00 P.M.—Banquet with Senior Academy

Saturday, April 3, 1937

- 9:00 A.M.—Inspection of exhibits, Smith Hall
 9:30 A.M.—Business Meeting
 10:00 A.M.—Presentation of Papers
 11:30 A.M.—Presentation of Awards
 12:00 M.—Junior and Senior Academy Barbecue
 2:30 P.M.—Sightseeing Trips
 8:15 P.M.—Lecture at Morgan Hall, Dr. Edgar Allen Hale, Yale University

Papers Presented

1. An Electric Arc Furnace,
 Sydney Lawrence West End High School
2. The Development of Artificial Light,
 Catherine McDonald Convent of Mercy Academy
3. Discussion of a Working Model of a By-Products Coke Oven,
 Dan Nunnally Woodlawn High School
4. The Cultural Value of Chemistry,
 Regina Emrich Bishop Toolen High School
5. The Fight Against Citrus Fruit Insects,
 Jack Bowling Murphy High School
6. The Production of Kraft Paper,
 Mary Foster Tuscaloosa High School
7. The Construction of a Crystal Microphone,
 James Mitchell Sheffield High School

8. Mosquito Control,
Sarah Graham.....Tuscaloosa County High School
9. Our Native Reptiles,
LaVerne Hale.....Shades-Cahaba High School
10. The History of Paper,
Mary Florence Rogers.....Mortimer Jordan High School
11. A Photo-electric Cell in a Test Tube,
Bill Mehan.....West End High School
12. Practical Photography,
Alice Jewel Townsend.....Montgomery County High School
13. The Relation of Physics to the Home,
Virginia Riley.....Hueytown High School
14. Making a 12-Tube Superhetrodyne Radio,
Frazier Hosmer.....West End High School
15. Synthetic Chemistry,
Jane Wilcox.....Visitation Academy

Prizes For Papers

- First Prize, Practical Photography,
Alice Jewel Townsend.....Montgomery County High School
- Second Prize, Working Model of a By-Product Coke Oven,
Dan Nunnally.....Woodlawn High School
- Third Prize, Our Native Reptiles,
LaVerne Hale.....Shades-Cahaba High School

Prizes For Projects

- First Prize, Woodlawn High School, Birmingham
- Second Prize, Tuscaloosa High School, Tuscaloosa.
- Third Prize, Bishop Toolen High School, Mobile.

Chapter Members of the Alabama Junior Academy of Science

- Baldwin County Science Club..... Bay Minette, Ala.
- Bishop Toolen High School—(Regina Emrich)*..... Mobile, Ala.
- Coffee High School..... Florence, Ala.
- Convent of Mercy Academy—(Catherine McDonald)*..... Mobile, Ala.
- DeKalb County High School..... Fort Payne, Ala.
- Ensley High School..... Ensley, Ala.
- Fairfield High School..... Fairfield, Ala.
- Hanceville High School..... Hanceville Ala.
- Hazlewood High School..... Town Creek, Ala.
- Hueytown High School—(Lucia McWhorter)*..... Bessemer, Rt. 1, Ala.
- Julia Tutwiler Wright Science Club..... Mobile, Ala.
- Minor High School..... Ensley Star Route, Ala.
- Montgomery County High School—(Vincent Bell)*..... Ramer, Ala.
- Mortimer Jordan High School—(Odell Fields)*..... Morris, Ala.
- Mount Hope Science Club..... Mount Hope, Ala.
- Murphy High School—(Jack Bowling)*..... Mobile, Ala.
- Phillips High School—(Clarence Dudley)*..... Birmingham, Ala.
- Ramsay High School..... Birmingham, Ala.
- Selma High School..... Selma, Ala.
- Shades-Cahaba High School—(Erma Jane Doran)*..... Homewood, Ala.
- Sheffield High School—(James Mitchell)*..... Sheffield, Ala.
- Spring Hill High School..... Spring Hill, Ala.
- Tuscaloosa High School—(Sara Graham)*..... Tuscaloosa, Ala.
- Visitation Academy—(Jane Gavin)*..... Spring Hill, Ala.
- West End High School—(Lily Mae Thomberg)*..... Birmingham, Ala.
- Woodlawn High School—(Joe Johnson)*..... Birmingham, Ala.

Officers of the Junior Academy 1937-1938

President, Clarence Dudley, Phillips High School, Birmingham, Ala.

Vice-President, William Pittman, Shades-Cahaba High School, Homewood, Ala.

Secretary, Bebe Faust, Woodlawn High School, Birmingham, Ala.

Treasurer, Dawson Kendrick, Woodlawn High School, Birmingham, Ala.

Counselors from the Alabama Academy of Science (To be appointed).

*Authorized delegates to the fifth annual meeting of the Alabama Junior Academy of Science, April 2 and 3, 1937.

MEMBERS OF THE ALABAMA ACADEMY OF SCIENCE

Abercrombie, W. F. (A)	Howard College, Birmingham, Ala.
‡Allen, Edgar (A)	Yale University, New Haven, Conn.
Allen, Roger W. (B)	Auburn, Ala.
†*Allison, Fred (G)	Auburn, Ala.
Andrews, T. G. (C)	University, Ala.
†Ayr's, O. L. (B)	1001 28th Place S., Birmingham, Ala.
Barnes, G. F. (B)	Judson College, Marion, Ala.
*Basore, C. A. (D)	Auburn, Ala.
Blair, Arthur J. (C)	1600 Brown-Marx Bldg., Birmingham, Ala.
Blair, C. S. (C)	Comer Bldg., Birmingham, Ala.
†Brakefield, J. L. (A)	Howard College, Birmingham, Ala.
*Brannon, Peter A. (C)	Dept. of Archives & History, Montgomery, Ala.
†Breckenridge, C. G. (A)	University, Ala.
†Bunton, Paul B.	602 Transportation Bldg., Washington, D. C.
Campbell, Justina (A)	State Teachers College, Livingston, Ala.
†Carlson, J. Gordon (A)	University, Ala.
†Carmichael, E. B. (B)	University, Ala.
Church, Anna E. (B)	University, Ala.
†Clark, B. F. (B)	Birmingham-Southern College, Birmingham, Ala.
Coons, Kenneth W. (B)	University, Ala.
Coulliette, J. H. (G)	Birmingham-Southern College, Birmingham, Ala.
†Cudworth, James R. (C)	University, Ala.
Culmer, Orpha Ann (E)	State Teachers College, Florence, Ala.
†Cunningham, Floyd F. (D)	State Teachers College, Florence, Ala.
Dale, Hugh (B)	Y. M. C. A., Birmingham, Ala.
DeJarnette, David (C)	University, Ala.
DeJarnette, James T., Jr. (C)	University, Ala.
Doggett, Wynelle (B)	2900 Pike Road, Birmingham, Ala.
Dorroh, J. L. (B)	Judson College, Marion, Ala.
Dubois, Franklin S. (A)	University, Ala.
Duggar, J. F., Sr. (A)	Auburn, Ala.
Emigh, Eugene D. (C)	Weather Bureau, Montgomery, Ala.
English, Arthur A. (A)	Box 708, Mobile, Ala.
†*Farmer, C. M. (A)	Troy, Ala.
Ferguson, John H. (F)	University, Ala.

- Fertig, George J. (D)..... Comer Bldg., Birmingham, Ala.
 Fidler, Herbert K. (A)..... University, Ala.
 Fies, Milton H. (D)..... University, Ala.
 †Foley, James O. (F)..... University, Ala.
 Foster, James R. (B)..... Box 307, Wilson Dam, Ala.
 Gandrud, B. W. (C)..... 406 19th Ave., Tuscaloosa, Ala.
 Gattmann, Lambert (A)..... St. Bernard College, Cullman, Ala.
 Geisler, Edith (A)..... Adger, Ala.
 Gerhardt, Henry (E)..... 1215 Elmira St., Mobile, Ala.
 Glazner, J. F. (D)..... State Teachers College, Jacksonville, Ala.
 †*Graham, John Y. (A)..... University, Ala.
 †Graves, Stuart (F)..... University, Ala.
 Griffin, Harrel (C)..... University, Ala.
 Grover, Marcus A. Box 590, Birmingham, Ala.
 Hagerty, Cornelius G. (A)..... University, Ala.
 Hall, Snowden C., Jr. (A)..... University, Ala.
 †Hargis, E. H. (F)..... 28th St., and 12th Ave., Birmingham, Ala.
 Hargreaves, G. W. (B)..... Auburn, Ala.
 †Harper, Roland M. (C)..... University, Ala.
 Harris, Albert S. (A)..... University, Ala.
 †Heath, Harry C. (A)..... 21 Agnew St., Montgomery, Ala.
 †Hess, Margaret (A)..... Judson College, Marion, Ala.
 Hixon, Charles R. (B)..... Auburn, Ala.
 Hodges, Robert S. (A)..... University, Ala.
 Holt, Rebie A.
 Montgomery Methodist Hospital Lab., Montgomery, Ala.
 Horton, Edgar C. (C)..... 1221 North 13th St., Birmingham, Ala.
 †Hunt, T. E. (F)..... University, Ala.
 †Hyde, John W. (A)..... N. J. State Planning Board, Trenton, N. J.
 Johanson, Theodore..... University, Ala.
 Jones, Carl T. (D)..... U. S. Forest Service, Knoxville, Tenn.
 †Jones, E. V. (B)..... Birmingham-Southern College, Birmingham, Ala.
 †Jones, Herman D. (B)..... Auburn, Ala.
 †*Jones, W. B. (C)..... University, Ala.
 †*Jones, W. C. (F)..... T. C. I. Hospital, Fairfield, Ala.
 Kassner, J. L. (B)..... 1000 13th St., Tuscaloosa, Ala.
 †Kaufmann, B. P. (A)..... University, Ala.
 †Kennedy, J. J. (A)..... University, Ala.
 Lawler, Matt..... Toulminville, Ala.
 *Lloyd, S. J. (B)..... University, Ala.
 *Loding, H. P. (A)..... 166 Houston St., Mobile, Ala.
 Lord, James (C)..... Russellville, Ala.
 McBurney, Ralph (F)..... University, Ala.
 McGlamery, Winnie (C)..... University, Ala.
 McTyeire, Clustie E. 1804 Arlington Ave., Bessemer, Ala.
 McVay, Thomas N. (B)..... University, Ala.
 MacKenzie, James T. (B)..... 4300 Glenwood Ave., Birmingham, Ala.
 Marsh, Alfred (D)..... Box 22, Jacksonville, Ala.
 Martin, H. M. (B)..... Auburn, Ala.
 Mobley, Willard M. (D)..... Alabama By-Products Corp., Tarrant, Ala.
 Montgomery, Jack P. (B)..... University, Ala.
 †Moore, W. A. (E)..... Birmingham-Southern College Birmingham, Ala.
 Nork, John Joseph (A)..... 809 East Clinton St., Huntsville, Ala.
 North, William E. (A)..... 12 W. Clarke St., Prichard, Ala.
 †Ott, W. P. (E)..... University, Ala.
 †Overton, A. G. (D)..... Alabama By-Products Corp., Tarrant, Ala.
 †Palmer, George D. (B)..... University, Ala.

- Partlow, W. D. (A).....Bryce Hospital, Tuscaloosa, Ala.
 Pearson, A. M. (A).....Auburn, Ala.
 †Poor, R. S. (C).....Birmingham-Southern College, Birmingham, Ala.
 †Prickett C. O. (A).....Auburn, Ala.
 Quinn, I. T. Dept. of Games & Fisheries, Montgomery, Ala.
 ‡Reinke, E. E. (A).....Vanderbilt University, Tenn.
 Reynolds, J. Paul (A).....
Birmingham-Southern College, Birmingham, Ala.
 Richards, Edward F. (C).....University, Ala.
 Riggan, Fred B. (D).....Stockham Pipe Fittings Co., Birmingham, Ala.
 †*Robinson, J. M. (A).....Auburn, Ala.
 *Robinson, Mary E. (A).....536 Princeton Ave., Birmingham, Ala.
 Rodgers, Eric (B).....University, Ala.
 †Rutledge, R. W. (A).....State Teachers College, Florence, Ala.
 †Salmon, W. D. (A).....Auburn, Ala.
 Sauer, Mary Elmore (A).....University, Ala.
 Sizemore, Troy B. (D).....1313½ N. 29th St., Birmingham, Ala.
 Sledd, Arthur (B).....Judson College, Marion, Ala.
 †Smith, Septima (A).....University, Ala.
 *Smyth, Patrick H. (G).....806 Winona Ave., Montgomery, Ala.
 †Sommer, Anna L. (B).....348 S. Gay St., Auburn, Ala.
 †Spieth, Alda May (A).....State Teachers College, Livingston, Ala.
 Tellier, Albert J. (E).....153 S. Monterey St., Mobile, Ala.
 Thomas, Gerald A. (B).....115 11th Ave., N., Birmingham, Ala.
 Thompson, Davis Hunt (B).....
care G. J. Fertig, Comer Bldg., Birmingham, Ala.
 Tower, James Allen (D).....
Birmingham-Southern College, Birmingham, Ala.
 Van Aller, T. S. (F).....902 Charleston St., Mobile, Ala.
 Walsh, Mary Vincent (B).....Visitation Academy, Mobile, Ala.
 Ward, W. W. (C).....Centre, Ala.
 †Westland, A. J. (G).....Spring Hill College, Mobile, Ala.
 White, A. H. (D).....706 9th Court, W., Birmingham, Ala.
 White, James M. (C).....717 St. Charles Ave., Montgomery, Ala.
 White, Urban (B).....St. Bernard College, Cullman, Ala.
 †*Whiting, W. A. (A).....
Birmingham-Southern College, Birmingham, Ala.
 Williams, J. W. (A).....Snead Junior College, Boaz, Ala.
 Williams, Sidney J. (A).....Livingston, Ala.
 Wingard, R. E. (B).....Auburn, Ala.
 Wood, Thomas A. (A).....Marion Institute, Marion, Ala.
 Woodall, Percy H. (A).....1101 27th Place, S., Birmingham, Ala.
 Wooley, Mary.....Murphy High School, Mobile, Ala.
 †Xan, John (B).....Howard College, Birmingham, Ala.
 †Yancey, Patrick H. (A).....Spring Hill College, Mobile, Ala.

*Charter members of the Alabama Academy of Science. The complete list so far as is known was published in Volume V of the JOURNAL p. 8.

†Member A.A.A.S.

‡Honorary Member.

The letters (A), (B), (C), (D), (E), (F), and (G) indicate: (A), Biology; (B), Chemistry; (C), Geology, Anthropology and Archeology; (D), Industry, Economics and Geography; (E), Mathematics; (F), Medicine; (G), Physics, as the chief field of interest of the member.

Associate Members

Braungart, Dale C.	University, Ala.
Bryant, Frances Jane	Veterans Hospital, Tuscaloosa, Ala.
Camp, George Lewis	Holt High School, Holt, Ala.
Cannon, Laura Mae	West End High School, Birmingham, Ala.
Capesius, John	St. Bernard College, Cullman, Ala.
DeWilton, Edward L.	University, Ala.
Eisenstein, Joseph Owen	University, Ala.
Eskridge, Marshall	University, Ala.
Gaston, E.	University, Ala.
Glass, Theodore G.	Y. M. C. A., Tulsa, Okla.
Howse, B. C.	333 38th St., Fairfield, Ala.
Kirk, Eugenia E.	University, Ala.
Lemmon, George James	University, Ala.
Lloyd, Frances V.	University, Ala.
Martin, Ernest C.	University, Ala.
Miles, Martha Fay	University, Ala.
Osburg, Theresa	University, Ala.
Pardue, Leonard G.	Weather Bureau, Montgomery, Ala.
Renger, J. J.	4415 Hedge St., Philadelphia, Pa.
Rushing, Edward D.	University, Ala.
Sulkin, Norman M.	507 Fourteenth Ave., Tuscaloosa, Ala.
Ward, Frederick W.	434 Forest Ave., Cincinnati, Ohio
Ward, Jane	Sweetwater, Ala.
White, James M., Jr.	717 St. Charles Avenue, Montgomery, Ala.

THE NEW YORK ACADEMY OF SCIENCES

77th Street & Central Park West

NEW YORK, N. Y.

AMERICAN MUSEUM
OF NATURAL HISTORY

THE JOURNAL
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OF SCIENCE

(Affiliated with A. A. A. S.)

APRIL, 1938

VOLUME 10

Part I

PROGRAM

of

THE FIFTEENTH ANNUAL MEETING
STATE TEACHERS COLLEGE
TROY, ALABAMA
APRIL 8 and 9, 1938

Office of the Editor

BIRMINGHAM-SOUTHERN COLLEGE
Birmingham, Alabama

ALABAMA ACADEMY OF SCIENCE

Program

Fifteenth Annual Meeting

STATE TEACHERS COLLEGE

Troy, Alabama

April 8 and 9, 1938



Officers

- President*, ROGER W. ALLEN.....Alabama Polytechnic Institute, Auburn
President-Elect, P. H. YANCEY.....Spring Hill College
Vice-President, J. GORDON CARLSON.....University of Alabama
Vice-President, G. W. HARGREAVES
Alabama Polytechnic Institute, Auburn
Vice-President, PETER A. BRANNON
Department of Archives and History, Montgomery
Vice-President, JOHN XAN.....Howard College
Secretary, SEPTIMA SMITH.....University of Alabama
Treasurer, B. F. CLARK.....Birmingham-Southern College
Councilor to A.A.A.S., P. D. BALES.....Howard College
Editor of the Journal, E. V. JONES.....Birmingham-Southern College

GENERAL PROGRAM

All Addresses and Section Meetings are open to the public.

FRIDAY, APRIL 8

- 8:30 A.M. REGISTRATION by all members and guests at entrance of Bibb Graves Building. Secure tickets for banquet (Friday, 7:30 P.M.), and register for Saturday field trips.
- 10:30 A.M. EXECUTIVE COMMITTEE MEETING, Room 10, Graves Building.
- 11:15 A.M. PRELIMINARY BUSINESS MEETING, Room 2, Graves Building. Appointment of Committees, etc. Adjournment until 5 P.M.
- 12:20 P.M. PHOTOGRAPH of the Academy in front of Graves Building.
- 12:45-1:30 P.M. LUNCHEON (Shackelford Hall. Price, 35 cents).
- 1:45 P.M. SECTION MEETINGS. Papers, discussions, demonstrations, election of section chairmen for 1938-1939.
- DEMONSTRATIONS will be held in Room 6, Graves Building.
- Section I.* Biology and Medical Science, Room 2, Graves Building. J. Gordon Carlson, Chairman; W. F. Abercrombie, Secretary.
- Section II.* Chemistry, Physics and Mathematics, Room 3, Graves Building. G. W. Hargreaves, Chairman; G. D. Palmer, Secretary.
- Section III.* Geology, Anthropology and Archeology, Room 5, Graves Building. Peter A. Brannon, Chairman; James M. White, Sr., Secretary.
- Section IV.* Industry, Economics and Geography, Room 4, Graves Building. John Xan, Chairman; V. A. Scalce, Secretary.
- 1:45 P.M. ALABAMA JUNIOR ACADEMY OF SCIENCE. Registration at Troy High School Building and assignment to rooms. James Holt Starling, chairman of arrangements.
- 5:00 P.M. FINAL BUSINESS MEETING, Room 2, Graves Building. Reports of Committees, announcement of Academy grant from A.A.A.S., other business, adjournment.
- 7:30 P.M. ANNUAL BANQUET (informal), Dining Room, Shackelford Hall, C. M. Farmer, Toastmaster. Tickets should be purchased when registering. (\$1.00 per plate.)

8:15 P.M. ANNUAL PUBLIC ADDRESS, Shackelford Hall.
Address of Welcome: C. B. Smith, President, State Teachers College, Troy.

Response: J. L. Brakefield, Howard College.

Presidential Address: "Anomalous Alabama", Roger W. Allen, Alabama Polytechnic Institute, President of the Academy.

Moving Pictures: Walter B. Jones, State Geologist of Alabama.

Informal Social: Social Room, Shackelford Hall.

SATURDAY, APRIL 9

9:00-11:00 A.M. GEOLOGICAL AND BOTANICAL FIELD TRIP to Pocosin. The trip will be conducted by Walter B. Jones, State Geologist, and will require about two and one-half hours. Open to all. Starts promptly.

9:00 A.M. *SECTION MEETINGS.* Those sections which did not complete their programs on Friday may do so at this time in the same rooms. There will be no meeting of Section III on Saturday.

2:00 P.M. TRIPS to Acid Plant, Oil Mills, Osteograph Company, Veneer Mills, and Lignite Deposits. Trips start from Kilby Hall.

N.B. Your promptness at all sessions, trips, etc., will be greatly appreciated.

FRIDAY AFTERNOON—1:45

SECTION I.

BIOLOGY AND MEDICAL SCIENCE

J. GORDON CARLSON, Chairman

W. F. ABERCROMBIE, Secretary

Room 2, Graves Building

1. THE OCCURRENCE OF *POLYGYRA HOPETONENSIS* (Shuttleworth), AN ATLANTIC COASTAL PLAIN SNAIL, IN ALABAMA. (10 min.)

—Allan F. Archer, Alabama Museum of Natural History.

Polygyra hopetonensis (Shuttleworth), hitherto unrecorded in Alabama, occurs in Birmingham. Its natural range is the Atlantic coastal plain of the southeastern states. It was probably introduced accidentally on plants imported from one of the Atlantic coast cities. It is one of fifteen species of Mollusca now residing in urban Birmingham.

2. DYAR'S RULE AS RELATED TO THE NUMBER OF INSTARS OF JAPANESE BEETLE LARVAE (*POPILLIA JAPONICA* NEWMAN). (10 min.)

—W. F. Abercrombie, Howard College.

The length and width of the head capsule of the three instars were measured at various stages. Dyarian ratios were calculated by dividing the measurements of one stage into those of the preceding stage. A comparison was made between the calculated and observed measurements to determine the applicability of Dyar's rule.

3. ALABAMA DRAGONFLIES (ODONATA)*. (15 min.)

—Septima Smith and Robert S. Hodges, University of Alabama.

In continuation of the study of Alabama Odonata made during 1935 and 1936, we report that the Smith-Hodges Collection has been increased from 2500 to approximately 4500 specimens, representing an addition of sixteen species or a total of one hundred and eleven. Special attention has been given in 1937 to the rearing of adults from their nymphs.

4. BOTANICAL DISCOVERIES AND WRITINGS OF CHARLES MOHR. (10 min.)

—Roland M. Harper, Geological Survey of Alabama.

Dr. Charles Mohr (1824-1901) probably contributed more to our knowledge of the flora of Alabama than any other botanist who ever lived. During more than forty years of residence in the state he discovered about 30 new species of plants, and published about 75 scientific papers, aggregating about 1,800 pages.

*Aided by the Academy Grant of the A.A.A.S.

5. THE "POCOSIN" OF PIKE COUNTY. (10 min.)

—Roland M. Harper, Geological Survey of Alabama.

The "pocosin," a few miles east of Troy, is a bit of forest that seems to have no counterpart anywhere near. It has excited the wonder of visitors since the middle of the 19th century; but the explanation of it seems quite simple.

6. POTASH SHALE IN SOIL BUILDING. (15 min.)

—Harry C. Heath, Huntingdon College.

This is a series of experiments in field plots to test for the benefit of potash shale for crops grown in soil deficient in potassium. The amounts of the crops harvested and the potash content of the leaves were taken as indicating available potash.

7. STIMULATION OF GERMINATION OF CROTALARIA SEED BY SCALDING; OPTIMUM TEMPERATURE AND DURATION OF SCALDING. (15 min.)

—J. F. Duggar, Alabama Polytechnic Institute.

To remove the condition that causes seed of the cultivated legume *Crotalaria spectabilis* to afford only extremely low germination, laboratory and field germination and other tests were made with seed variously treated. Scalding proved best of the treatments tested; optimum temperature and duration were established.

8. CYTOLOGICAL STUDIES ON *CROTALARIA RETUSA*. (15 min.)

—Norman M. Sulkin, University of Alabama.

The morphology of somatic chromosomes of *C. retusa*, with special emphasis on the chromenema cycle, will be considered in addition to other cytological phenomena, such as spindle fibers and periodicity of the mitotic division.

9. MITOTIC BEHAVIOR OF DISTAL CHROMOSOME FRAGMENTS IN THE NEUROBLASTS OF THE GRASSHOPPER EMBRYO. (15 min.)

—J. Gordon Carlson, University of Alabama.

X-ray treatment causes breakage of the chromosomes of a cell to produce two main classes of fragments: those possessing and those lacking points of spindle fiber attachment. A striking similarity manifests itself in the behavior of these two kinds of fragments during cell division.

10. WHITE FRINGED BEETLE (*NAUPACTUS LEUCOLOMA*) IN ALABAMA. (8 min.)

—J. M. Robinson, Alabama Polytechnic Institute.

The white fringed beetle (*Naupactus leucoloma*) was recently introduced into an area surrounding Florida, Alabama, and Svea, Florida. Another infestation, over a smaller area, has been found near Laurel, Mississippi. The larva is subterranean and feeds generally on the roots of domesticated and wild plants. The adult is parthenogenetic.

SECTION II.

FRIDAY AFTERNOON—1:45

CHEMISTRY, PHYSICS AND MATHEMATICS

G. W. HARGREAVES, Chairman

G. D. PALMER, Secretary

Room 3, Graves Building -

1. GONIOMETRY STREAMLINED. (10 min.)
—W. A. Moore, Birmingham-Southern College.

"The sine of an arc is the ordinate of its end point". Definitions such as this are defended from a historical as well as logical standpoint and from these definitions emerges "A Streamlined Trigonometry", more rigorous, more elegant in its generalizations, more clearly understood, more quickly learned, and more easily remembered and applied.

2. STATISTICAL, METEOROLOGICAL, AND CLIMATOLOGICAL, DATA AVAILABLE FOR SCIENTIFIC WORKERS.
—E. D. Emigh, Meteorologist, Weather Bureau, Montgomery.

The paper will touch on the history of weather records, go into detail concerning hourly, daily, monthly and annual records of the Weather Bureau, and touch on the more recent developments in aerological research.

3. DISTRIBUTION FUNCTION FOR COSMIC RAY IMPULSES. (15 min.)
—Eric Rodgers, University of Alabama.

A comparison is made of the application of several distribution laws from the theory of probability to a set of experimental results on the time distribution of cosmic rays as recorded with a Geiger-Muller counter.

4. THE USE OF POLARIZED TUNGSTEN ELECTRODES IN ACIDIMETRY AND ALKALIMETRY. (10 min.)
—J. L. Kassner, University of Alabama.

Polarized tungsten electrodes have been used in acidimetry and alkalimetry reactions. The potential change at the end point occurs at a pH of 8 in each case. Data are given to show the effect of current density on the magnitude of the potential change at the end point.

5. AN IMPROVED METHOD FOR PREPARING 6-AMINOQUINOLINE AND ATTEMPTS TO CONVERT IT TO THE 6-HYDROXY COMPOUND. (15 min.)
—G. W. Hargreaves and A. B. Marshall, Alabama Polytechnic Institute.

In preparing 6-aminoquinoline by the reduction of the 6-nitro compound with stannous chloride, the yield has been greatly increased and the time considerably shortened by substituting ether extraction for the precipitation with hydrogen sulfide. Attempts to substitute the hydroxy for the amino group are described.

6. AN INVESTIGATION OF SOME LITTLE KNOWN REACTIONS OF CALCIUM CARBIDE. (15 min.)

—B. F. Clark, Birmingham-Southern College.

The discussion will center around a process proposed in an English patent for the production of symmetrical dialkyl acetylenes. Investigation has proven that the reaction does not go in the manner set out in the patent. Reference will also be made to results obtained with acetone, chlorobenzene, etc.

7. A MODIFIED COMBUSTION APPARATUS FOR CARBON AND HYDROGEN DETERMINATIONS. (15 min.) (Lantern.)

—George D. Palmer, University of Alabama.

A modification of the Fischer combustion apparatus is used. Electric furnaces are made by the student. This apparatus has been found to give accurate results even when very small samples are used. It has the advantage of economy.

8. FUEL BRIQUETTES FROM ALABAMA LIGNITE BY DESTRUCTIVE DISTILLATION AT LOW TEMPERATURES AND BRIQUETTING THE RESIDUE WITHOUT A BINDER. (15 min.)

—C. A. Basore, Alabama Polytechnic Institute.

In southern Alabama raw materials are available which apparently are sufficient for several important industries if a cheap fuel was available. Apparently there is also a need for a cheap domestic fuel in this region. Consequently efforts to produce a high grade fuel from the lignite deposits which underlie much of south Alabama appeared to be of value. This paper summarizes the work that has been carried out along this line.

BY TITLE

THE HOROCYCLE AND THE ABSOLUTE UNIT OF LENGTH.

—Henry Gerhardt, Mobile.

In euclidean geometry there exists an absolute unit of angles, the complete revolution, but the unit of length is conventional. In non-euclidean geometry (hyperbolic) there is an absolute unit of length also.

This paper determines this unit for the horocycle.

FRIDAY AFTERNOON—1:45

SECTION III.

GEOLOGY, ANTHROPOLOGY AND ARCHEOLOGY

PETER A. BRANNON, Chairman

JAMES A. WHITE, SR., Secretary

Room 5, Graves Building

1. SOME "ACID TESTS" FOR STATES. (15 min.)
—Roland M. Harper, Geological Survey of Alabama.

The several states of the Union differ in innumerable ways, and many attempts have been made in recent years to apply statistical measures to them, to show how they rank in certain particulars. Too much emphasis has been placed on wealth, in which the southeastern states are rather deficient; but these states are near the top in some other things that count just as much.

2. METHOD OF PROCEDURE FOR A PALEONTOLOGICAL REPORT ON WELL SAMPLES. (15 min.) (Lantern.)
—Winnie McGlamery, Geological Survey of Alabama.

To show the procedure in examining samples from a well for paleontological report, besides outlining method of preparation of samples, slides have been made of the microfaunas both from well samples and from corresponding surface samples. We have also for exhibit some representative macrofossils from formations discussed.

The plan is to consider a well located on the Marianna and extending into the Tuscaloosa formation, giving some characteristic fossils and noting lithology of each formation penetrated.

3. STRATIGRAPHY OF THE UPPER CRETACEOUS SERIES IN ALABAMA AND MISSISSIPPI. (15 min.)
—Watson H. Munroe, U. S. Geological Survey (Special Invitation, Geological Survey of Alabama).

The Upper Cretaceous sediments of the eastern Gulf region crop out in a crescentic band around the southwestern end of the plunging Appalachian highlands in a belt 500 miles long and up to 75 miles wide. The formations named from oldest to youngest, are the Tuscaloosa, the Eutaw, the Selma Chalk, the Ripley, the Prairie Bluff Chalk, and the Providence Sand, in all aggregating a thickness of about 2,300 feet.

4. GEOLOGY OF THE TROY DISTRICT. (10 min.) (Lantern.)
—Walter B. Jones, State Geologist of Alabama.

Troy is located near the contact between the Providence sand member of uppermost Cretaceous and the Clayton limestone member of lower Cretaceous age. Southwest of Troy in the Conecuh River valley is a wide belt of Naheola. Covering all of these formations is a blanket of orange sand, the age of which is not definitely known.

5. BUTTERFLY TRAVELERS, WITH SPECIAL REFERENCE TO THE MIGRATING YELLOW BUTTERFLY, *CATOPSILIA EUBULE*, PERHAPS BETTER KNOWN AS *CALLIDRYAS EUBULE*. INFORMATION DERIVED FROM OBSERVATIONS MADE DURING A PERIOD OF OVER EIGHTEEN YEARS. (15 min.)

—Patrick H. Smyth, Meteorologist (Retired).

Southeastward flight over Montgomery, beginning in the latter part of summer and continuing during the autumn and early winter; return northwestward flight in the early spring. Weather conditions accompanying increase and decrease in number of migrants.

Notes on the Gulf Fritillary and Monarch.

6. LATE ARCHEOLOGY. (15 min.) (Lantern.)

—Peter A Brannon, Alabama Department of Archives and History.

This paper attempts to show European trade objects found on Indian town sites in connection with purely aboriginal tools and cultural artifacts when these pre-historic things are uncovered in the characteristic scientific manner.

7. A LAYMAN'S VIEW OF ARCHEOLOGY: SPECIFICALLY BESSEMER MOUND EXCAVATION, 1934-1935. (15 min.) (Lantern.)

—Edgar C. Horton, Birmingham Anthropological Society.

Field project of a course in Archeology; an object lesson in mound exploration. Finds not numerous, but surprising; stone floor transformed by fertile imagination to a duck effigy; inhumation of a dog, impressive reminder of man's long attachment for him. Archeology too conservative; need for more correlation and induction.

8. PROGRESS OF THE ARCHEOLOGICAL SURVEY OF THE WARRIOR RIVER. (10 min.) (Lantern.)

—Walter B. Jones, State Geologist of Alabama.

For some six years, the Alabama Museum of Natural History has been conducting archeological survey of the Warrior River. The survey has been completed above Tuscaloosa, and for part of the region south of Tuscaloosa. After studying material from hundreds of sites, it has been concluded that the aboriginal occupation of this interesting stream valley extended over a long period of time. Many cultures are represented, including modern Indian.

9. ARCHEOLOGICAL EXCAVATIONS IN THE TENNESSEE VALLEY REGION OF ALABAMA. (15 min.) (Lantern slides and motion pictures.)

—David L. DeJarnette, Alabama Museum of Natural History.

This paper deals with results of excavations in the Tennessee Valley in the area which is now flooded by the backwater of the Pickwick Dam. Preliminary conclusions in the study of the material reveal the cultures to be roughly divided into four groups, namely:

1. Pre-pottery people living at the base of the shell mounds.
2. Pottery-using people living on top of the shell mounds.
3. An earth mound burial complex.
4. Earth mound dwelling complex.

SATURDAY MORNING—9:00

SECTION I.

BIOLOGY AND MEDICAL SCIENCE

J. GORDON CARLSON, Chairman

W. F. ABERCROMBIE, Secretary

Room 2, Graves Building

1. MORTALITY STUDIES ON RATS AFTER LETHAL DOSES OF TRICHINELLA SPIRALIS. (12 min.)

—Reed O. Christenson, Alabama Polytechnic Institute.

Experimental trichinosis in rats presents many of the clinical manifestations occurring in man. This paper presents by means of photographs all of the essential stages in the development of the parasite with emphasis on the lethal tissue invading forms. The present status of human trichinosis will be briefly considered.

2. PRELIMINARY REPORT OF OBSERVATIONS ON MORPHOLOGY OF MICROFILARIA IMMITIS. (10 min.)

—R. L. Mundhenk, Alabama Polytechnic Institute.

a. Nocturnal periodicity found variable. b. Variations noted in Fulleborn's measurements. c. Segmentation noted. d. Absence of sheath observed. e. Presence of tube-like proboscis noted. f. Constant presence of five papillae on head observed. g. Presence of articulated, crest-like spine noted on head. h. Larvae observed to be of feeding type.

3. ORGANIZATION AND ACTIVITIES OF THE BUREAU OF LABORATORIES OF THE ALABAMA STATE DEPARTMENT OF HEALTH. (12 min.)

—S. R. Damon, State Department of Health, Montgomery.

The Bureau of Laboratories is organized with a central laboratory at Montgomery and eight branch laboratories located in Dothan, Mobile, Tuscaloosa, Anniston, Huntsville, Decatur, Birmingham and Selma. Administration of this system is centered in Montgomery. Service to the people of Alabama is rendered through the county health units and the practicing physicians of the state.

4. ANNUAL BLOOMING DATES OF CERTAIN COMMON PLANTS POSSIBLY ASSOCIATED WITH THE OCCURRENCE OF HAY FEVER. (12 min.)

—J. F. Dugger, Alabama Polytechnic Institute.

After reference to accepted views regarding influences that initiate blooming, notes are presented on the dates at which the writer found certain plant species began blooming in certain years. These data are offered as a possible basis for correlation by medical specialists with the incidence of hay fever together with the particular plant species responsible.

5. PLANTS CAUSING HAY FEVER IN ALABAMA. (12 min.)
—Clarence K. Weil, Montgomery.

Of the various wind-borne pollens in Alabama only a few are responsible for hay-fever. These include pecan, oak, elm, the grasses and the ragweeds. Attention is called to an unidentified pollen found between May 15th and September 20th that is the chief cause of summer hay-fever.

6. HOUSE DUST IN THE TREATMENT OF ALLERGY. (10 min.)
—Ralph M. Clements, Tuscaloosa.

House dust is regarded by many physicians as a very important factor in the treatment of allergy.
This paper is a discussion of this very interesting subject.

7. LEUCOCYTOSIS IN EXPERIMENTAL ANIMALS IN RESPONSE TO INJECTIONS OF COLLOIDAL CARBON. (10 min.)
—L. E. Starr, Alabama Polytechnic Institute.

Various colloidal or so-called colloidal preparations have been advocated by certain investigators and commercial biological houses for the treatment of infectious diseases. The therapeutic effect is based on the increase in leucocytes following the injection of such products with an increased phagocytic activity. This report shows the results obtained in rabbits following the intravenous injection of colloidal preparations.

8. THE REDUCTION OF EXPERIMENTAL POLYCYTHEMIAS BY LIVER ADMINISTRATION. (12 min.)
—John Emerson Davis, University of Alabama.

Polycythemia was produced in eleven dogs by two experimental methods: (1) by daily treadmill running exercise, and (2) by feeding cobaltous chloride in daily doses of 8 mgm. per kgm. of body weight. In spite of continuation of these hematopoietic stimulating measures, the administration of liver promptly reduced the polycythemia.

9. THE BODY TEMPERATURE OF THE CHIMPANZEE. (10 min.)
—John M. Bruhn and J. H. Elder, University of Alabama and Yale Laboratories of Primate Biology, Orange Park, Florida.

The daily variations of the body temperature of young and adult chimpanzees have been determined by methods involving, in the case of adult animals, cooperation between observer and animal. The data are discussed with particular reference to age and sexual cycle.

10. PREPARATION AND CARE OF RAW PELTS IN ALABAMA. (10 min.)
—Fred S. Barkalow, Jr., Alabama Polytechnic Institute.

Commercial trappers in Alabama consistently lose money due to their haphazard methods of skinning. This paper considers the various methods employed by the taxidermist and equally applicable to commercial skinning to bring out the best qualities of the pelt. Notes on the incidence of certain fur-bearing mammals in Alabama.

SATURDAY MORNING—9:00

SECTION IV.

INDUSTRY, ECONOMICS AND GEOGRAPHY

JOHN XAN, Chairman

V. A. SCALCE, Secretary

1. LAND UTILIZATION IN THE GREAT APPALACHIAN VALLEY OF ALABAMA.

—J. F. Glazner, State Teachers College, Jacksonville.

A study of the uses of land from a land utilization map of a cross section of the area.

2. ECONOMICS OF FOUNDRY SAND SITUATION IN ALABAMA.

—Fred B. Riggan, Stockham Pipe Fittings Co., Birmingham.

Alabama has excellent foundry sand deposits, but the producers need to use the new grading system to satisfy the present, and expand the future, markets for their product.

3. ORIENTING THE T. C. I. TRAINING PROGRAM.

—A. S. Hotchkiss, Tennessee Coal, Iron and Railroad Company, Birmingham.

Introduction sets up the purpose, relationship of thoughts and things and raises the issues.

Orientation is in keeping with the winnowed educational experience of humanity. Six contemporary forms of training in industry,—supervisory, apprentice, job, instructor, cooperative and college graduate are now being developed by the T.C.I. Company.

4. APPRENTICESHIP PLAN OF AMERICAN CAST IRON PIPE COMPANY.

—S. D. Moxley, American Cast Iron Pipe Company, Birmingham.

The American Cast Iron Pipe Company operates an apprenticeship system covering the trades involved in the plant whereby shop work is coordinated with technical class room work. The apprentice is paid his regular rate during this class room work, and is offered an additional bonus upon completion of the apprentice contract.

5. THE FAILURE OF COTTON RESTRICTION.

—J. Allen Tower, Birmingham-Southern College.

Production control was adopted in an attempt to solve the problems of the cotton surplus and low prices. It has been a failure and is bringing more serious problems to the South. Other more promising lines of attack exist.

6. SOME FUNDAMENTALS IN WILDLIFE CONSERVATION.

—I. T. Quinn, Alabama Department of Conservation, Montgomery.

- | | |
|-------------------|------------------------------------|
| 1. Soil-water | a). Water |
| | b). Wind |
| 2. Soil fertility | a). Population depends on carrying |
| Erosion | capacity—food. |
| | b). Care of brood stock. |
| 3. Fire—Effect on | a). Soil |
| | b). Water |
| 4. Pollution | a). Industrial |
| | b). Municipal |
| | c). Soil |

7. SOME USES OF PERCHLORIC ACID IN INDUSTRIAL METALLURGICAL ANALYSIS.

—V. A. Scalce, Stockham Pipe Fittings Co., Birmingham.

Perchloric Acid is especially suitable for the routine determinations of Silicon and Chromium in Stainless Steels. The Perchlorate methods for these elements effect a considerable saving in time over the older methods. Results obtained are accurate enough for routine analysis. The chief disadvantage is the difficulty in reading the exact end-point but this may be overcome after long practice.

OFFICERS OF THE JUNIOR ACADEMY—1937-1938

<i>President</i> , CLARENCE R. DUDLEY.....	Phillips High School Birmingham, Alabama
<i>Vice-President</i> , WILLIAM PITTMAN.....	Shades-Cahaba High School Birmingham, Alabama
<i>Secretary</i> , BEBE FAUST.....	Woodlawn High School Birmingham, Alabama
<i>Treasurer</i> , DAWSON KENDRICK.....	Woodlawn High School Birmingham, Alabama
<i>Counselors from the Alabama Academy of Science—</i>	
JAMES L. KASSNER.....	University of Alabama University, Alabama
N. R. BRUNDRETT.....	Phillips High School Birmingham, Alabama
<i>Chairman of Local Committee on Arrangements—</i>	
JAMES R. STARLING.....	Troy High School Troy, Alabama

CHAPTER MEMBERS OF THE ALABAMA
JUNIOR ACADEMY OF SCIENCE

1. Auburn High School.....	Auburn
2. Baldwin County High School.....	Bay Minette
3. Bishop Toolen High School—Geraldine Woodcock*.....	Mobile
4. Coffee County High School.....	Florence
5. Convent of Mercy Academy—Peggy Lloyd*.....	Mobile
6. DeKalb County High School—Woolford Clayton*.....	Fort Payne
7. Ensley High School—Doris Lawson*.....	Birmingham
8. Fairfield High School.....	Fairfield
9. Hanceville High School.....	Hanceville
10. Hazelwood High School.....	Town Creek
11. Hueytown High School—Virginia Riley*.....	Bessemer
12. Minor High School—Wensey Hambly*.....	Ensley
13. Montgomery County High School—Eleanor Gardner*.....	Ramer
14. Mortimer Jordan High School—Alton Little*.....	Morris
15. Mount Hope High School.....	Mount Hope
16. Murphy High School.....	Mobile
17. Phillips High School—George Postell*.....	Birmingham
18. Ramsay Tech. High School.....	Birmingham
19. Selma High School.....	Selma
20. Shades-Cahaba High School—William Pittman*.....	Birmingham
21. Spring Hill High School.....	Spring Hill
22. Tuscaloosa County High School—Fred Clayton*.....	Northport
23. Tuscaloosa Senior High School—Herndon Dowling*.....	Tuscaloosa
24. Visitation Academy.....	Spring Hill
25. West End High School.....	Birmingham
26. Woodlawn High School—Joe Jones*.....	Birmingham

*Authorized delegates to the Sixth Meeting of the Junior Academy.

PROGRAM OF THE JUNIOR ACADEMY

SESSIONS: TROY HIGH SCHOOL

FRIDAY, APRIL 8, 1938

- 1:00 P.M. Registration at Troy High School and assignment to rooms. Arrangements of exhibits.
- 3:00 P.M. Business Meeting of all Officers, Sponsors, Counselors and Delegates.
- 4:00 P.M. Inspection of Exhibits.
- 4:30 P.M. Sightseeing Trips.
- 7:00 P.M. Annual Banquet. Entertainment Program (50 cents per plate).
- 9:00 P.M. Dance—Troy State Teachers College.

SATURDAY, APRIL 9, 1938

- 8:30 A.M. Inspection of Exhibits, Troy High School.
- 9:00 A.M. Seating of Delegates. Business Meeting.
- 9:30 A.M. Presentation of Papers. Presentation of Awards.
- 12:00 A.M. Barbecue. Compliments of Troy State Teachers College.

PAPERS PRESENTED

1. Valence.....Geraldine Woodcock, Bishop Toolen High School
2. The Role of Bacteria in Nature.....
.....Peggy Lloyd, Convent of Mercy Academy
3. *To be announced*..... Robert Purdy, DeKalb County High School
4. Elliptical Surfaces in Aeronautics...Edward Sears, Ensley High School
5. Pipe Making in the World's Largest Plant.....
.....Herbert Stockdale, Hueytown High School
6. Chordates—The Highest Forms of Life
.....Grace Franklin, Minor High School
7. Photography.....Vincent Bell, Montgomery County High School
8. Municipal Powers.....Herschell Hicks, Mortimer Jordan High School
9. A Project in Consumer Education...James Coffield, Phillips High School
10. Principles of Flight..... Robert McNutt, Shades-Cahaba High School
11. Poisonous Snakes in Alabama
.....D. H. Turner, Tuscaloosa County High School
12. Principles of the Cottrell Smoke Precipitator
.....Herndon Dowling, Tuscaloosa Senior High School
13. Model Airplane Construction.....Jerry Kepner, West End High School
14. Synthetic Resins Joe Jones Woodlawn High School

THE JOURNAL
of the
ALABAMA ACADEMY
OF SCIENCE

(Affiliated with A. A. A. S.)

JUNE, 1938

VOLUME 10
PART 2

PROCEEDINGS AND ABSTRACTS
of
THE FIFTEENTH ANNUAL MEETING
STATE TEACHERS COLLEGE
TROY, ALABAMA
APRIL 8 and 9, 1938

Office of the Editor
BIRMINGHAM-SOUTHERN COLLEGE
Birmingham, Alabama

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ALABAMA ACADEMY OF SCIENCE

OFFICERS FOR 1938-1939

President, P. H. YANCEY..... Spring Hill College, Mobile, Ala.

President-Elect, GEORGE D. PALMER..... University, Ala.

Vice-Presidents and Section Chairmen :

E. V. SMITH, Biology and Medical Sciences,
..... Alabama Polytechnic Institute, Auburn, Ala.

G. D. PALMER, Chemistry, Physics and Mathematics, University, Ala.

WINNIE MCGLAMERY, Geology, Anthropology and Archeology,.....
..... Geological Survey of Alabama, University, Ala.

J. F. GLAZNER, Industry, Economics and Geography.....
..... State Teachers College, Jacksonville, Ala.

Secretary, SEPTIMA SMITH..... University, Ala.

Treasurer, JOHN XAN..... Howard College, Birmingham, Ala.

Councilor of A.A.A.S., J. H. COULLIETTE, Birmingham-Southern College, Ala.

Editor of the Journal, E. V. JONES Birmingham-Southern College, Ala.

PAST PRESIDENTS

WRIGHT A. GARDNER (2 terms)..... Auburn..... 1924-1926

STEWART J. LLOYD University..... 1926-1927

JOHN R. SAMPEY Howard College..... 1927-1928

WALTER C. JONES Birmingham..... 1928-1929

FRED ALLISON..... Auburn..... 1929-1930

EMMETT B. CARMICHAEL..... University..... 1930-1931

GEORGE J. FERTIG Birmingham..... 1931-1932

J. F. DUGGAR..... Auburn..... 1932-1933

J. L. BRAKEFIELD..... Howard College..... 1933-1934

R. S. POOR Birmingham-Southern College..... 1934-1935

A. G. OVERTON Alabama By-Products Corp..... 1935-1936

WALTER B. JONES University..... 1936-1937

ROGER W. ALLEN Auburn..... 1937-1938

GENERAL PROGRAM

Fifteenth Annual Meeting

STATE TEACHERS COLLEGE

Troy, Alabama

April 8-9, 1938

FRIDAY, APRIL 8

- 8:30 A.M. REGISTRATION at entrance of Bibb Graves Building. Secure tickets for banquet and register for trips.
- 10:30 A.M. EXECUTIVE COMMITTEE MEETING, Room 10, Graves Building.
- 11:15 A.M. PRELIMINARY BUSINESS MEETING, Room 2, Graves Building. Appointment of Committees, etc. Adjournment until 5 P.M.
- 12:20 P.M. PHOTOGRAPH of the Academy in front of Graves Building.
- 12:45- 1:30 P.M. LUNCHEON (Shackelford Hall. Price 35 cents).
- 1:45 P.M. SECTION MEETINGS. Papers, discussions, demonstrations, election of section chairmen for 1938-1939. DEMONSTRATIONS, Room 6, Graves Building.
- 1:45 P.M. ALABAMA JUNIOR ACADEMY OF SCIENCE. Registration at Troy High School Building and assignment to rooms. James Holt Starling, Chairman of arrangements.
- 5:00 P.M. FINAL BUSINESS MEETING, Room 2, Graves Building.
- 7:30 P.M. ANNUAL BANQUET (informal), Dining Room, Shackelford Hall, C. M. Farmer, Toastmaster. (\$1.00 per plate.)
- 8:15 P.M. ANNUAL PUBLIC ADDRESS, Shackelford Hall.
Address of Welcome: C. B. Smith, President, State Teachers College, Troy.
Response: R. S. Poor, Birmingham-Southern College.
Presidential Address: "Anomalous Alabama", Roger W. Allen, Alabama Polytechnic Institute, President of the Academy.
Moving Pictures: Walter B. Jones, State Geologist of Alabama.
Informal Social: Social Room, Shackelford Hall.

SATURDAY, APRIL 9

- 9:00-11:00 A.M. GEOLOGICAL AND BOTANICAL FIELD TRIP to Pocosin. The trip will be conducted by Walter B. Jones, State Geologist, and will require about two and one-half hours. Open to all. Starts promptly.
- 9:00 A.M. SECTION MEETINGS. There will be no meeting of Section III on Saturday.
- 2:00 P.M. TRIPS to Acid Plant, Oil Mills, Osteograph Company, Veneer Mills, and Lignite Deposits. Trips start from Kilby Hall.

MINUTES OF THE MEETING OF THE EXECUTIVE COMMITTEE, APRIL 8, 1938

The meeting was called to order at 10:30 A.M. by Roger W. Allen, President of the Academy, in Room 9, Bibb Graves Building.

1. *Minutes*: The minutes of the previous meeting of the Executive Committee held at the University of Alabama, April 2, 1937 were read by the Secretary. They were approved as read.

2. *Treasurer's Report*: Dr. B. F. Clark, Treasurer, reported that the Academy had 87 paid members with dues totaling \$109.00 owing from over 52 unpaid individuals. He reported that five papers on the program were from ineligible individuals, four of whom, however, were presenting them by invitation; the fifth was expected to pay at the meeting. Thirty-six new members were added during the year; eight moved out of the state; and nine owed dues for two years or more. There were no reinstatements. He considered that progress had been made in limiting the papers to paid membership and invitation list.

3. *Report of the Acting-Permanent Counselor from the Academy to the Junior Academy*: Dr. James L. Kassner, the Acting-Permanent Counselor, together with P. H. Yancey, Pres.-Elect, and Roger W. Allen, President, presented a mimeographed sheet of proposed amendments to the by-laws of the Junior Academy with P. H. Yancey acting as spokesman. It was moved that the Executive Committee approve the action of this Special Committee on the Junior Academy in drawing up these proposed amendments to the Junior Academy By-laws, and that it approve the continuance of a similar committee for another year. Action on these proposed amendments was deferred for another year, and a committee composed of President, President-Elect and the Acting-Permanent Counselor was continued to work on this matter.

Dr. Kassner made the suggestion that a certificate of award, instead of cash prizes which were unavailable, be presented for the winning papers and prize exhibits in each of the subdivisions represented by the Junior Academy, and displayed such a certificate suitably enc scrolled. P. H. Yancey moved and G. W. Hargreaves seconded the approval of such a certificate. Motion carried. The President requested Dr. Kassner to present this proposition at the preliminary business meeting.

4. *Report from E. V. Jones, Editor of the Journal*: The President read a request from the Editor urging all past and present officers of the Academy to forward all correspondence concerning the Academy to him for binding. Report appended.

5. *Secretary's Report*: The Secretary suggested that, as a matter of convenience for the members, the secretary be eliminated, so far as possible, as the "middle man" in arranging the annual program. The Treasurer insisted that it was the Editor's request that the Secretary be maintained in that capacity in order to relieve the Editor of excessive work. No definite action was taken in the absence of the Editor.

6. *Adjournment*: At the end of business, the meeting adjourned.

MINUTES OF THE PRELIMINARY BUSINESS MEETING

The meeting was called to order by Roger W. Allen, President of the Academy, at 11:15 A.M. in Room 2, Graves Building. The minutes of the previous preliminary business meeting, held at University of Alabama, April 2, 1937, were read and approved.

Reports of the standing committees:

1. *Report of the Couucilor of the A.A.A.S.*: P. D. Bales, Councilor of the A.A.A.S., was unable to be present. His report was read by J. H. Coulliette. Report appended.

2. *Report of the Editor of the Journal*: Due to illness in his family the Editor was unable to be present at the meeting. The report was read in his absence by B. F. Clark. He reported an exchange of complete files with the Missouri Academy of Science; reported progress in collecting and arranging for binding early correspondence files of the Academy; urged immediate cooperation by officers, former and present, in sending in correspondence for filing; and announced 100% cooperation of members on the program in sending in their previews. It was moved by P. H. Yancey and seconded by James L. Kassner that the report be accepted. It was so ordered.

3. *Report of the Acting-Permanent Counselor of the Junior Academy*: James L. Kassner presented his idea of a certificate award to be presented the winning members and winning exhibits of the Junior Academy. It was moved by Kassner and seconded by C. M. Farmer that such a certificate be presented. It was so ordered.

4. *Report of the Treasurer*: B. F. Clark, Treasurer, reported a balance on hand April 1, 1937 of \$161.03. Membership fees and reprints from the Journal, 1937, \$277.80. Total, \$438.38. Disbursements for 1937-38, report ending April 7, 1938, for stationery, postage, title blanks, printing of the Journal, and incidental expenses, \$228.62. This leaves a balance on hand, April 7, 1938 of \$210.21. The report was referred to the Auditing Committee, action upon it being deferred until the 5:00 o'clock business meeting. Report appended.

5. *Appointment of Committees*: The following committees were appointed by the President and asked to report at the 5:00 o'clock Business Meeting.

1. *Auditing Committee*: (a) for the Senior Academy: John Xan, chairman; J. H. Coulliette and L. E. Starr. (b) for the Junior Academy: James L. Kassner, chairman and B. F. Clark.

2. *Resolutions Committee*: Walter B. Jones, chairman; Peter Brannon and George D. Palmer.

3. *Committee on Place of 1939 Meeting*: P. H. Yancey, chairman; George W. Hargreaves and J. Gordon Carlson.

4. *Nominating Committee*: Russell S. Poor, chairman; Roland M. Harper and J. F. Duggar, Sr. The President informed the committee that three officers were to be nominated, namely, the President-Elect, Treasurer, and Councilor of A.A.A.S.

5. *Charter Membership Committee*: Peter A. Brannon, Curator of Archives and History, Montgomery, was requested to compile the material on the activities of the Charter Members and the founding of the society, the information to be presented at a charter membership meeting to be held in connection with the 1939 meeting of the Academy at Montgomery. He agreed to do so.

6. *Announcements*: C. M. Farmer, host of the 1938 meeting of the Academy, made a series of announcements regarding the banquet, hotel accommodations, photograph to be taken in front of Bibb Graves Building, the luncheon at Shackelford Hall, the reception in the parlors of the same building, the barbecue and field trips on Saturday, including the Geological and Botanical field trips conducted by Walter B. Jones and Roland M. Harper in the morning, and a repetition of the same in addition to trips to the Acid Plant, Oil Mills, Osteograph Company, Veneer Mills, and Lignite Deposits in the afternoon.

MINUTES OF THE FINAL BUSINESS MEETING

The final business meeting was called to order at 5:00 P.M. in Room 2, Bibb Graves Building, by Roger W. Allen, President. The minutes of the previous final business session held at the University of Alabama, April 2, 1937, were read by the Secretary. They were approved as read.

Reports of the standing committees:

1. *Committee on the Academy Award*: This committee was composed of P. H. Yancey, President-Elect, and the four Vice-Presidents of the Academy. The award from the A.A.A.S. was given to J. Gordon Carlson, of the Zoology Department of the University, the recipient serving as non-voting member of the committee.

2. *Auditing Committee for the Senior Academy*: John Xan, chairman, reported approval by the committee of the Treasurer's report. Its adoption was moved by J. H. Coulliette, seconded by Peter A. Brannon, including a recommendation for the purchase of a permanent record book by the Treasurer. It was so ordered.

3. *Auditing Committee for the Junior Academy*: The President announced that this report would be given by mail.

4. *Resolutions Committee*: Report of the committee was made by Walter B. Jones, chairman, who moved its adoption. Report appended.

5. *Committee on Place of 1939 Meeting*: The committee reported through P. H. Yancey, chairman, that one invitation had been received namely from Huntingdon College, Montgomery. The chairman, seconded by John Xan, moved the acceptance of the invitation. It was so ordered.

6. *Nominations of Section Chairmen*:

Section I. Biology and Medical Sciences:

E. V. Smith, Alabama Polytechnic Institute, Auburn.

Section II. Chemistry, Physics and Mathematics:

G. D. Palmer, University of Alabama

Section III. Geology, Anthropology and Archeology:

Winnie McGlamery, Geological Survey of Alabama, University

Section IV. Industry, Economics and Geography:

J. F. Glazner, State Teachers College, Jacksonville

7. *Committee for the Nomination of Officers 1939*:

President-Elect: George D. Palmer, University of Alabama.

Treasurer: John Xan, Howard College.

Councilor of the A.A.A.S.: J. H. Coulliette, Birmingham-Southern College.

Russell S. Poor, chairman, made this report. The Secretary is retained for another two years; the Editor for one year. Report adopted. It was moved by J. F. Duggar, Sr., seconded by Peter A. Brannon that the Secretary cast the vote for the above nominations. It was so ordered.

The President expressed his great appreciation for the cooperation of all officers and members of the Academy during the current year and extended a welcome and hope for mutual profit to the new members. He read regrets at being unable to attend the meeting from E. V. Jones, Editor of the Journal; P. D. Bales, Councilor of A.A.A.S.; and J. L. Brakefield, who was scheduled to respond to Address of Welcome at the banquet. Russell S. Poor was selected to substitute for J. L. Brakefield. Appreciation of the Academy was given to Christine Adcock, Alabama Museum of Natural History, for inscribing the shingles. A motion was made by John Xan, seconded by W. B. Jones, to include the name of the high school teacher who

had sponsored the papers or exhibits which won the Junior Academy Certificate of Award on the certificate. It was so ordered.

Following final announcements by C. M. Farmer, the meeting adjourned. Over sixty members and about as many visitors registered.

SEPTIMA SMITH, *Secretary*

REPORT OF THE TREASURER FOR THE YEAR ENDING APRIL 7, 1938

RECEIPTS

Balance on hand April 1, 1937.....		\$161.03
Membership fees and reprints from Journal.....	\$277.80	277.80
		<hr/>
		\$438.83

DISBURSEMENTS

Fred B. Riggan (79) postage.....	1.50	
C. M. Farmer (80) postage.....	2.25	
W. B. Jones (81) Dr. Denny's plate at banquet.....	1.00	
Birmingham Printing Co. (82) Journal part 1.....	50.83	
Birmingham Printing Co. (83) Journal part 2.....	133.23	
E. V. Jones (84) editor's expenses.....	8.00	
N. D. Kendrick (85) (from Jr. Acad. reserve).....	5.00	
Cash (86) stamps for treasurer.....	5.00	
Birmingham Printing Co. (87) stationery.....	13.67	
Birmingham Printing Co. (88) title forms.....	8.14	228.62
		<hr/>
Balance, Tarrant Branch, First National Bank.....		\$210.21

B. F. CLARK, *Treasurer*

Audited and found correct

April 8, 1938

Auditing Committee:

JOHN XAN
J. H. COULLIETTE
L. E. STARR

THE REPORT OF THE COUNCILOR OF THE A.A.S.

The report of the Councilor, P. D. Bales, directed attention particularly to the meeting of the Academy Conference in Indianapolis, Indiana, December 27, 1937. At this meeting two papers and a report were presented. One of the papers by the incoming chairman of the Academy Conference, E. C. L. Miller of the Virginia Academy, under the title "What Next?" laid a definite challenge before the Conference. The opening paragraph of this paper is illuminating.

"The Academy Conference started a few years ago, just as a dinner provided by the A.A.A.S. for the representatives of the various

affiliated state academies. That simple beginning apparently had a spark of vitality in it because it has grown, as live things are apt to do, until now it is an important part of the Christmas meeting, and is coming to be a sort of combination of the A.A.A.S. and the state academies. This is a most promising combination because of the size, dignity, and leadership of the A.A.A.S. and because each state academy is in close touch with scientific matters in its own state. If this combination works together wisely and energetically, great results can be accomplished. This Academy Conference is the focal point at which this combination is effected."

Another paragraph lifted from the middle of this paper gets at the heart of its challenge.

"Most of the difficulties that afflict this old world—wars, poverty, depressions, strikes, etc., have their roots in human nature. The traditional thought is that human nature cannot be changed, but we know so little about what human nature really is. If mother love, which heretofore has been considered a typical aspect of human nature and almost sacred, can be shown to be due to a hormone, who knows what discoveries may be just ahead? It may be that out of this may grow a science of human nature much as biochemistry has grown out of Wohler's discovery of the synthesis of urea. At any rate, here is a largely undeveloped field for science, as undeveloped, perhaps, as general science was when the A.A.A.S. was organized. If the A.A.A.S. has been a factor in the development of science what, if anything, can it do now to accelerate the development of this rather backward or neglected field which may hold within its self undreamed-of possibilities?"

The second paper, "The Place and Reasons for Existence of State Academies" by Frank E. Germann of the Colorado-Wyoming Academy developed briefly ten points which may be summarized as follows:

1. Afford excellent opportunities for local men of science to get acquainted.
2. Give younger men the experience of participation in science gatherings.
3. Do a very important work in fostering junior academies.
4. Bring together workers from all fields of science.
5. Remove fear and shyness which keep many men from attempting to give papers before the national groups.
6. Many scientific problems are local in character and are excellent topics for symposia at state academy meetings.
7. Where funds are available local problems may be investigated and the results reported in the academy publications.
8. They afford the worker a friendly group criticism of doubtful methods or conclusions.
9. They offer a wide variety of leadership and, therefore, of heightened interests.
10. They stimulate professional interest and increase the membership of the national organizations.

Otis Caldwell, General Secretary of the A.A.A.S., reported to the Academy Conference on Academy Uses of Research Grants.

REPORT OF THE ACTING-PERMANENT COUNSELOR OF THE JUNIOR ACADEMY

A meeting was held at Tuscaloosa at the close of the annual meeting in 1937 at which were present the officers of the Alabama Academy of Science both old and new, the present and past counselors of the Junior Academy, and the former presidents of the Senior Academy. This meeting was called for the purpose of finding out what could be done by way of clarifying the duties of the officers of the Junior Academy and of the counselors of the Academy. At the close of this meeting each of the members present agreed to put his ideas concerning the duties of the various officers and counselors in writing. These reports were to be sent to me at the University of Alabama, and I, in turn, agreed to formulate a composite report from the various suggestions. A copy of this report was then sent to the President and President-Elect of the Senior Academy. They later met with me in Tuscaloosa and went over each phase of the Junior Academy program, step by step. Concluding this discussion a final draft of the proposed amendments to the by-laws of the Junior Academy was drawn up.

It had been suggested at the meeting in Tuscaloosa that a third counselor of the Junior Academy be appointed. This counselor is to be known as the "Permanent Counselor" and he is to hold office indefinitely.

The proposed amendments and by-laws outlined in detail the duties of the officers of the Junior Academy and of the three counselors. This report also clarifies such points as (i) hospitality for visiting members, (ii) appointment of committees to take care of the annual meeting and their duties, (iii) appointment of judges, (iv) information that should be obtained concerning the annual meeting and forwarded to the chapters, (v) information that should be obtained from the chapters concerning the annual meeting, and (vi) program rules, etc.

The President and the President-Elect of the Senior Academy asked me to assume the duties of the "Permanent Counselor" for this year in order to put the proposed program into operation. I held two meetings with the officers of the Junior Academy and the counselor of the President. The first meeting was held in October and the second on January 1. At the October meeting I gave each of the officers of the Junior Academy and the counselor a copy of his duties and a copy of the amendments and proposed by-laws of the Junior Academy. We voted at this meeting to operate this year according to the proposed program and then rewrite it, if necessary, before presenting it to the chapters for their approval.

In attempting to work out a definite policy for securing awards for the best exhibits presented by members of the Junior Academy at the annual meeting the Acting-Permanent Counselor has drawn up a certificate of award that could be used for this purpose. The cost of these certificates over a period of years is not prohibitive. In addition it gives the chapters something that they can frame and show with pride in years to come. The certificate is so worded that it can be used as an award for the best paper presented at the annual meeting. The award will be signed by the President and Secretary of the Senior Academy as well as by the Permanent Counselor, and will bear the seal of the Senior Academy.

Up until this year the records of the Junior Academy have not been kept in a Secretary's book. This year a large Secretary's book has been secured and the history of the Junior Academy has been written into it.

An attempt to add new chapters throughout the state did not meet with any degree of success. Only three new chapters were added to the list—Coffee County High School at Enterprise, Seale High School at Seale, and Butler County High School at Greenville. I believe that the Senior Academy should formulate some definite policy to interest science clubs in the state in the Junior Academy. At present only about thirty of the high school science clubs in the state are affiliated with the Junior Academy. We have a total of 347 accredited senior high schools in the state of Alabama.

In conclusion, I would like to suggest that we give the President and President-Elect of the Senior Academy and the Acting-Permanent Counselor of the Junior Academy the authority to revise the amendments and proposed by-laws of the Junior Academy as they see best and then operate under the proposed program at least one more year before it is incorporated into the constitution of the Junior Academy.

JAMES L. KASSNER
Acting-Permanent Counselor
of the Alabama Junior Academy of Science

REPORT OF THE EDITOR OF THE JOURNAL

April 6th, 1938

The Editor regrets very much that circumstances over which he has no control prevent his attendance upon the fifteenth annual meeting of the Alabama Academy of Science.

We are glad to announce that exchange relations have been established with the Missouri Academy of Science. Furthermore, we expect to add still another exchange to our list in the very near future.

We have made considerable progress in collecting and arranging for binding the early correspondence files of the Academy. The collection to date represents each year back to the organization of the Academy. An appeal is hereby made to each present and former officer of the Academy to send in his files for this compilation of Academy correspondence. The former officers will be canvassed by personal letters in the near future.

The excellent cooperation of the officers and members has made possible the inclusion of 100 percent of the previews of the papers on the program. It is sincerely hoped that a continuation of this fine cooperation will bring in an abstract of from one hundred to three hundred words of each paper delivered at this meeting.

E. V. JONES, *Editor*

REPORT OF RESOLUTIONS COMMITTEE

WHEREAS, the Alabama Academy of Science has just held its fifteenth annual meeting at the Troy State Teachers College

AND WHEREAS, the steady growth of the Academy renders increasingly difficult the task of acting as host

AND WHEREAS, it is the unanimous opinion of the members of the Academy who are its guests that the success of the meeting has been due to the carefully laid and well executed plans of the Administration and Faculty of Troy State Teachers College

THEREFORE, BE IT RESOLVED, That the Alabama Academy of Science express its appreciation to the Troy State Teachers College for the generous hospitality extended to the Academy as a whole, and for the numerous courtesies shown to individual members.

BE IT FURTHER RESOLVED that a copy of these resolutions be forwarded to President C. B. Smith, and that a second copy be spread upon the minutes of the Academy.

Respectfully submitted,

WALTER B. JONES, *Chairman*

PETER A. BRANNON

GEORGE D. PALMER, JR.

ANNUAL ADDRESS OF THE PRESIDENT OF THE ACADEMY

ANOMALOUS ALABAMA

—Roger W. Allen, Alabama Polytechnic Institute.

A description of the God-given mineral and agricultural, climatic and geographical resources of this State reads like a fairy tale.

Alabama's 52 inches of rainfall annually is almost twice as abundant as the 28 inch average for the country at large. Its warm climate will produce almost any of the staple crops and many of the vegetables and fruits of the American table. The long growing season is of about eight months.

Fifteen hundred miles of rivers are ready to carry varied products to the open sea. Running through rich coal fields a number of these waterways serve admirably for the production of abundant steam and cheap electric power, making possible numerous types of metallurgical and electro-chemical industries.

The State has an almost unbelievably large number of high grade soil types. The semi-tropical coastal plains to the South, the temperate plateaus to the North and the fertile Black Belt of central Alabama yield soils suited to almost every need.

Of the land normally in cultivation about one-third is devoted to cotton, especially inviting to the establishment of humming textile mills. An equal acreage is usually planted in corn which, along with the heavy rainfall and thriving pasturage grasses, offers much appeal to cattle raising and a dairying industry. About one-sixth of its forest lands is covered with virgin timber, the greater part of the balance having been logged once or twice, is mostly restocked with new growth, which favorable climatic conditions will convert into paper stock size every ten years. About half of the timber stand is in hard woods, much of which is well suited to furniture manufacture. Half is in miscellaneous soft woods and pine enough to make the production of naval stores one of the State's major industries as well as furnishing abundant pulp for the Charles Herty paper mills and rayon plants of the near future.

Nature's concentrated horde of iron ore, bituminous coal and limestone within a few miles of each other in the great Birmingham district

seems to be unmatched elsewhere on this globe. The low production cost of pig iron resulting from this unique mixture of natural wealth makes possible the manufacture of the multitudinous variety of finished cast iron and steel products that are demanded by an advanced civilization. Incident to such ferrous metallurgy the coke, gas and by-product chemicals that result therefrom constitute the foundations of other industries too varied to mention here.

Lower grade but promising deposits of a dozen other minerals are known. A network of adequate railroads and a climate that permits year round outdoor work are precious assets.

Alabama likewise abounds in human wealth. It possesses almost three million people. An increase of 60 percent since 1900 is largely due to an amazing ability to produce children. The birth rate of 24 per thousand contrasts markedly with the 16 per thousand average for the country at large.

Somewhat more than a third of the population is colored. In 1900 there were 45 percent Negroes, in 1936 only 35 percent.

Contrary to popular impression, the size of the Negro family is somewhat smaller than that of the average white family, there being 4.3 members in the former to 4.8 in the latter.

Alabama is predominantly an agrarian state, but the rural increase in the population has climbed very slowly as compared to that of the cities. Eighty-eight percent of the people lived on the farm in 1900. Today this has dropped to 72 percent. Only 18 percent of the gainfully employed people are in manufacturing industries.

In striking contrast to its tremendous natural resources and human wealth, however, Alabama is characterized and is nationally known because of its many distressing deficiencies. Potentially one of the richest states, we rank forty-seventh in per capita income. In a nation that has two-thirds of civilization's banking resources, one-third of Alabama's people are living marginal or sub-marginal lives. Many are housed under conditions that are unfit for human habitation by any standard of decency. Possessing inherent capacities that could give a super-abundant living to all we have derived so little from our immense possessions. The chasm that separates our actualities from our potentialities is as tragic as it is wide. Spending \$41,000,000 annually in other states for farm produce that can and should be grown at home we do not even feed ourselves and our livestock.

We are a very backward people educationally. Among the states of the Union we rank forty-second in white illiteracy, forty-seventh in Negro illiteracy. In 1930 sixteen percent of our people over 21 years of age could not read or write. Thirty percent of our children of school age were not even enrolled. Sixty percent of the white children that enter the first grade drop out before reaching the seventh. Of the Negro children starting to the first grade, two-thirds never get to the second, and only 11 percent ultimately enter junior high school.

Based upon the population in each state between five and 17 years of age, comparable data collected during the most prosperous decade of our history, 1922-1932, shows that Alabama would have to spend 99.8 percent of its total state and local tax revenue in order to bring its educational standards up to those for the country as a whole. This compares with only 31 percent of its total taxes the average state would have to pay.

Perhaps the most conspicuous feature about our people is its bi-racial composition. The Negro complicates every phase of our political,

social and economic life. The orthodox white attitude toward him results in a waste of astonishing magnitude. Duplicate schools and churches are required. Although only one-ninth as much is spent on his education in Alabama as on the white child, such a wide discrepancy seems neither just nor desirable. As long as his economic level is as low as it is he constitutes not only a continuing lost market to the State's commerce, but contributes relatively little to its advancement and requires so much of its substance. If less energy were spent trying to keep him innocuous and a more rational attitude and open minded study taken of how to get the largest possible value out of him it would unquestionably go far toward bettering the economic level of both. He is not an extraneous foreign element in our population for he is as typically southern as the white man. The bi-racial condition is the normal, not an abnormal one in this State. It is not something to be cured, but is something to be developed.

We are a youthful people. Almost 50 percent of our inhabitants are under 21 years of age. Though a great asset in many respects, this condition throws an extra economic burden on an already impoverished state for there are more youngsters to feed and educate and fewer adults with which to do it. Less than a tenth of Alabamians are over 55 years of age.

Wasted strength and inefficiency all too often result from debilitating health conditions. Where medical care is needed most, it is conspicuously unavailable. One-fifth of us have hookworm, and one out of every seven is known to be syphilitic.

Several thousand more people leave Alabama annually than come into the State to live. Although our excess birthrate over the deathrate is 11 per thousand, this surplus human wealth is continuously being driven away because of limited opportunities and a sub-marginal level of existence, a stupendous potential market for the State's commerce and produce literally thrown to the four winds.

The ever increasing rate at which farm tenancy is developing is of major significance. Sixty-seven percent of Alabama's farm people are tenants, approximately one-half of whom move to other farms each year. Having little or no interest in the upkeep of the premises and land they occupy for such brief periods, the presence of such a large proportion of these people on our farms explains many of our sins, not the least of which is the depletion and erosion of our soil. In a recent issue the Anniston Star pictured the Alabama sharecropper as the rest of the United States sees him, as follows:

"He lives on a dreary, soil-depleted farm in an unpainted shack with a sagging porch and strips of burlap over broken window panes. He is a taciturn person who emphasizes his silence with frequent ejections of tobacco juice, prefers to hunt with mournful hounds, seldom sees five dollars in cash and his credit is limited. His wife is barefoot and his staring children will grow up to be replicas of their father."

Assuming that this is an extreme characterization, it is nevertheless true that farm tenancy is distressing in its extent and portent. Sixty percent are white. The average family income is \$107 per year. In a recent survey by the State Health Department one county showed over one-third of these people with venereal diseases, and other health conditions deplorable. Over one-third cannot read or write.

Our relative dearth of cultural institutions and accomplishments is apparent. Libraries are not going to flourish, symphony orchestras

and art museums cannot exist where the necessities of life are so meager. Serious efforts in sculpturing, original architecture, lasting literature, creative painting and music are blocked or never given a chance to begin, and are unknown, unseen and unheard of to most of our people. Stupendous, but undeveloped and untrained potentialities are contrasted on every hand with the realities of dire want and great need.

Going hand in hand with these human deficiencies is the tragic exploitation, unfavorable trade balance, and neglect of our timber, minerals and soil. The pioneer farmer indiscriminately cleared timbered acres in a disgraceful manner and the lumberman followed him with thoughtless abandon. Preservation of young growth was unknown. What was not slashed away was fired, a parasitic goose killing a productive one that would have laid him another golden egg every ten years. Mute evidence of our continuing loss of timber resources is found in the fact that of the annual lumber cut less than one-fourth is used locally, the other being shipped away to other states and countries.

Eighteenth in mineral wealth, Alabama's unfavorable balance of exported raw materials to imported manufactured goods adds further weight to our burdens. The low income we get from the North and East for our mined products compares very poorly with the high prices that must be paid for their return as automobiles, tools, oilcloth, mayonnaise, etc. Exploitation through neglectful mining practices and lack of serious attempts to utilize low grade ores and by-products has been our past rule. Costly conservation is our future necessity.

Sub-marginal land that should have been left in forests, and cleared hillsides too steep for profitable cultivation have only too often had to be abandoned to eroded gullies, briars and foxes. The very heavy rainfall and hot sun, blessings on the one hand, play havoc with unprotected land. Legumes grown in the winter, decompose rapidly when turned under, enriching the soil to an amazing extent for the spring cotton and corn, yet are "gone with the rain to the four winds" by another crop time. Red rivers on the one hand and porous, sandy soil on the other are proof enough that our rich climatic heritage can and has worked two ways. Unterraced hillsides have moved top soil from Alabama into the Gulf of Mexico until the average farmer spends one-tenth of his annual income on fertilizer in an attempt to replace it. This contrasts sharply with the lot of the Texas farmer who buys less than one-tenth as much fertilizer and spends twice as much on labor as his Alabama contemporary. Lost fertility accompanied by low yields or high fertilizer bills have been our lot. And the oft maligned one-crop culture is not to blame for the leaching and washing of our fields - moves at least fifty times as much plant food annually as all crops combined. Agent C. H. Bedingfield, of Lee County, puts it as follows:

"When a farmer's top soil moves off his place it becomes his move next. Nature works about 200 years in building one inch of top soil. We clear, cultivate and leave it terraced and twice this amount may be washed away in one season. No farmer, as a farmer, can be richer than the soil he cultivates. During wet weather our soil fertility goes down the streams, during dry weather it goes up in smoke. The soil on an average Alabama farm under present conditions will last the lifetime of a mulc, land receiving reasonable care will last the lifetime of a man, land properly terraced and cropped will last the lifetime of a nation, and land in grass and forests is everlasting."

That our low spendable income and many deficiencies are mutually interlocked is apparent. In 1930 the per capita wealth of the United States was \$2600, that in Alabama was \$1200. In total state and local tax collections we ranked last with \$20 per capita. This compared with the tax burden of \$31 in Mississippi, and of \$81 in New Jersey. But Alabama does stand at the top in some things, for instance, sixth in burglary, second in "homicides through negligence", and first in murder.

Predominantly rural, our farm averages are distressingly low. Whereas over 50 percent of our population lives on the farm, it produces only 25 percent of the State's income. In 1930, we ranked forty-fifth in gross farm income, with \$1030, forty-seventh in cash farm income, with \$629.

That our farming is too dependent upon one crop and is therefore more of a hazardous enterprise than a mode of life is evident. Cotton accounts for 42 percent of the farm income, livestock products for 24 percent, and corn for 12 percent. Of the United States cotton crop, Alabama dropped from 11 percent in 1914 to less than nine percent in 1931. Meanwhile Texas was jumping from 28 percent of the total production to 32 percent.

The historical background upon which we rest contains several possible explanations of our present low estate in the national picture. The one usually put forward was the destruction incident to a disastrous war that left both the slaveless white man and the liberated Negro penniless and the countryside in a badly run down condition. A recent syllabus of the State Department of Education speaks of it as follows:

"The surviving Confederate soldiers missed many of their former neighbors. They found the white people demoralized and sometimes divided among themselves, and the Negroes, free, bewildered and disorderly.

"Evidence was everywhere that the South had maintained the desperate conflict until she was utterly exhausted. She had given up her best manhood. The accumulated capital of the people had disappeared in liberated slaves and worthless Confederate stocks, bonds and currency. The labor system was no more, and this was the fundamental blow to the economic system."

To just what extent this disastrous episode accounts for our ills will never be known, of course. Certain it is that it was a very important factor, but the charge is sometimes made against us that we use it too much as an "excuse", whereas the real trouble lies elsewhere. The presence of the Negro offers another explanation. His slave labor before the war and his cheap labor since is pointed to as having lulled us into easy going and unenterprising, if not a lazy people; that we spend too much of our time intolerantly and resentfully "defending" our sins instead of openmindedly examining the facts and doing something about them. Still others blame our one-crop system of agriculture for our dilemma, pointing out that we till "old" land as compared to the West and Southwest, and that our farming went "big business" after the World War causing production of an "export" crop to skyrocket beyond all normal expectations and reasonable markets.

But whatever the cause a third of our people constitute a potential market of tremendous proportions that cannot be exploited because they do not have the means with which to buy what they need. Under the past and present cotton culture these people are faring poorly enough but what seems to be ahead is not reassuring. We are already gradually losing our domestic cotton markets to the Southwest, our foreign

markets to Russia, Egypt, Brazil, China and elsewhere. On our relatively small and hilly farms, to what extent the mechanical cotton picker and cultivator is going to shift this activity away from us even more rapidly and entirely upset our traditional social setup is not known. Should such an eventuality develop, the prospect of locating some other cash crop to replace King Cotton in Alabama seems poor, for to whatever we might try to turn a well established culture and controlled market would almost surely be found already well established.

But, enough of this gloomy side of the picture! Are there not encouraging trends in sight that offer promise of helping us realize a more abundant life from our potential resources?

First in importance, it seems to some, has been the unmistakable shifting in thought during the past few years to the thesis that a democratic government worthy of the name cannot longer ignore unemployment, sub-marginal subsistence, waste of natural resources, unethical business practices, unlimited production of export crops, low educational standards, waste of agricultural lands, etc.

Uncle Sam seems definitely committed to the task of making our democracy democratic for once, keeping our system of private enterprise within certain bounds that give promise of saving it from itself. Evidently believing that every dollar spent in the interest of the common good and in social rehabilitation is the best possible national defense, our government seems destined to use the tax dollar obtained from those of us who have, more and more in the interest of those of us who have not. This effort toward continuous redistribution of the annual income to the end that the general economic level will be raised and domestic markets widened is of especial interest to Alabama.

During 1937 over 11,000 loans, averaging \$248, were made to rural rehabilitation families in this State. A \$1,000,000 regional farm laboratory is soon to be established in this region, its efforts to be devoted to new uses and outlets for farm commodities and by-products. The recent referendum participated in by the cotton farmers curtailed the 1938 production to the end that they are to be paid for setting more acres free for diversification and soil improvement, leading to a better balanced agriculture. Realizing that a democracy cannot succeed unless a liberal system of education is furnished to all who express themselves on national policies at the ballot box, the Congress has before it now a message from the President asking for enlarged Federal grants to the backward states for the improvement of their school systems. Our Public Welfare work, CCC and NYA activities constitute other recent ways in which we are feeling this Federal beneficence. Whether we agree with its wisdom or not it is to be unquestionably a major factor in the future of this State.

And of no less importance is the gratifying way in which our State and Southern leaders are putting their alert and experienced minds on our common troubles. The newly created Alabama Chamber of Commerce, with its vigorous campaign of encouraging the establishment of industrial plants suitable for processing the products of each county, is a notable example. Our State Extension Service program that is diligently attempting to increase our income from livestock products, and the training it is giving to 80,000 rural boys and girls in 4-H Club Work is another. The people of Alabama are putting 41 percent of their State revenue into education compared with 27 percent for the rest of the Southeast, an investment, small as it is, that will ultimately yield the State a higher economic return than anything else they might do.

These and other bright signs add encouragement to our gratitude for those leaders who have heroically labored for us in the past against the obstacles of poverty, ignorance, religious and social bigotry. Our future hope is evidently about the conference table. State lines are meaning less and less as the fact finders of the South are appealing to our reason for united effort in attacking unfair freight rate barriers, the evils of tenancy, etc. Theories are giving way to facts. Blind allegiance to decrepit tradition is gradually passing as the light of truth about our actualities encompasses us in its ever widening-circle. More of the rank and file are accepting our situation as a challenge and are cooperating in numerous ways for a long but organized pull. We are becoming "Brain Trust" minded and local, state and regional planning boards are just around the corner. Once American ingenuity really puts itself to the cooperative task of eliminating our human deficiencies, I have faith that very thing will be accomplished.

ABSTRACTS OF PAPERS PRESENTED

April 8 and 9, 1938

SECTION I

BIOLOGY AND MEDICAL SCIENCES

ORGANIZATION AND ACTIVITIES OF THE BUREAU OF LABORATORIES OF THE ALABAMA STATE DEPARTMENT OF HEALTH

—S. R. Damon, State Department of Health, Montgomery.

The Bureau of Laboratories is organized with a central laboratory at Montgomery and eight branch laboratories located in Dothan, Mobile, Tuscaloosa, Anniston, Huntsville, Decatur, Birmingham and Selma. Administration of this system is centered in Montgomery. Service to the people of Alabama is rendered through the county health units and the practicing physicians of the state.

ANNUAL, BLOOMING DATES OF CERTAIN COMMON PLANTS POSSIBLY ASSOCIATED WITH OCCURRENCE OF HAY FEVER

—J. F. Duggar, Alabama Polytechnic Institute.

From a long list of plants on which the writer through a number of years has made casual observations on the beginning of blooming dates at Auburn (or beginning of heading of grasses), the following are selected as among those possibly connected with hay fever:

Kind GRASSES:	Years av.	Av. initial bloom date	Kind COMPOSITES:	Years av.	Av. initial bloom date
Annual bluegrass.....	9	Feb. 11	Sow thistle.....	4	Jan. 31
Texas bluegrass.....	7	March 24	Red sorrel, (non-comp.)	7	March 27
Bulbous bluegrass.....	2	March 20	Butter and eggs.....	4	April 4
Rescue grass.....	8	March 29	Narrow-leaf plantain.....	4	April 4
Smooth wild barley.....	5	April 5	Whitetop	5	April 9
Cheat	3	April 18	Dogfennel	5	May 3
Ital. rye grass.....	5	April 30	Ironweed	2	May 6
Red top grass.....	2	May 13	Bitterweed	7	June 8
Johnson grass.....	2	May 15	Erigeron	2	July 14
Bermuda	4	May 26	Giant ragweed, (non-comp.)	4	Aug. 18
TREES:			Goldenrod	2	Aug. 26
Elm	5	Jan. 30	Ragweed, (non-comp.)	6	Sept. 2
Maple	5	Feb. 3	White aster.....	2	Sept. 18
3 Oaks.....	1	March 12	Purple aster.....	2	Sept. 24
Cottonwood	2	March 16			

THE BODY TEMPERATURE OF THE CHIMPANZEE

—John M. Bruhn and J. H. Elder, University of Alabama and Yale Laboratories of Primate Biology, Orange Park, Florida.

Four adult female chimpanzees were trained to submit to the introduction of a thermocouple junction into the vagina in order that a temperature uninfluenced by local cooling might be obtained.

The temperature readings were taken twice daily during several sexual cycles.

It was found that marked variations occur in the temperature of an animal from day to day and on the same day there may be considerable difference in the temperature taken at 9:00 A.M. and at 3:00 P.M. In general the P.M. temperatures tended to be higher than the A.M. temperatures.

The daily variations could not be correlated with phases of the sexual cycle, environmental temperature, or humidity.

The results are summarized in the following table.

Animal	No. expts.	9:00 A.M.		3:00 P.M.		Diff. of A.M. & P.M. Temperatures	
		°C.	Stand. dev.	°C.	Stand. dev.		
Nira	55	37.68	.247	44	37.75	.203	.07
Fifi	55	37.45	.314	44	37.67	.251	.22
Cuba	26	37.75	.314	21	37.89	.246	.14
May	26	37.84	.352	21	37.93	.297	.09

ALABAMA DRAGONFLIES (ODONATA)*

—Septima Smith and Robert S. Hodges, Department of Zoology, University of Alabama.

In continuation of the work reported last year for 1935 and 1936, the Smith-Hodges Collection of Alabama Odonata has been increased to approximately 4500 specimens representing 111 species. Emphasis has been placed on larval forms and reared specimens which now include 58 species. An effort has been made to collect a sufficiently large series of both adults and nymphs to provide material for future study of the many problems associated with this order. Through the cooperation of Dr. Walter B. Jones, Director of the Alabama Museum of Natural History, the Herbert Smith collection of Alabama Odonata (1911-1914) of 570 specimens, representing 54 species has been made available to us. This adds two species to our list and a number of locality records.

In this list twenty-five counties are represented, some only by sporadic collecting. As in most other states, accessibility has, to a considerable extent, restricted activities to one section, namely, Tuscaloosa County, now represented by ninety-nine species and which continues to afford a rich field with many problems.

Among some unusual and interesting associations found in Tuscaloosa County are those of *Gomphus lineatifrons* and *Gomphus vastus*, heretofore recognized of more northern range, and *Gomphus dilatatus* of south Georgia and Florida. Two species of a rare genus, *Helocordulia selysii* and *Helocordulia uhleri*, the latter considerably south of its reported range, have afforded a good series and reared specimens of both. Another interesting find in this county is *Neurocordulia virginicensis* and another species which is tentatively identified as *Neurocordulia obsoleta clara*, heretofore known by a single specimen in the Brooklyn Museum.

Alabama Odonata collected during 1935, 1936 and 1937 compared with the published record of that of several states and sections.

Number of Species Recorded in Each Subfamily

	ALA. (Smith- Hodges)	N. C. (Brimley)	FLA. (Byers) authentic records	IND. (William- son)	CONN. (Garman)	N. Y. (Ncedham)	S. E. STATES	GULF COAST (Wright)	NORTH AMERICA (Ncedham)
Petalurinae	1	1	1	1	...	1	1	...	2
Gomphinae	18	15	11	21	17	30	38	...	76
Aeschninae	9	10	9	12	12	16	14	5	34
Corduligasterinae	2	5	2	3	4	4	5	...	8
Macromiinae	4	3	3	5	1	2	6	...	11
Cordulinae	11	7	10	9	13	19	19	...	39
Libellulinae	35	30	34	30	27	37	46	20	75
Agrioninae	4	5	4	5	4	5	5	...	11
Lestinae	3	5	5	9	9	9	8	...	16
Coenagrioninae	24	26	34	30	25	36	46	...	88
Total.....	111	107	113	125	112	159	188	25	360

*Aided by the Academy Grant of the A.A.A.S.

Lack of space does not admit listing the names of the species in each subfamily. This would render more evident the limited geographic range of some species and the general distribution of others, thus in the New York list of 159 species, 100 are to be found in the southeastern states, 74 in Alabama and 50 in Florida. Wright, 1937, published a list of 25 anisopterous dragonflies from the Central Gulf Coast Region which indicates a comparatively poor Odonata fauna but one represented by the relative abundance of a few species. Alabama is favored by some Appalachian forms in the northern half of the state and there is a possibility of finding additional native Florida species in the southern portion.

DYAR'S RULE AS RELATED TO THE NUMBER OF INSTARS
OF THE JAPANESE BEETLE LARVA (*POPILLIA JAPONICA*
NEWMAN)

—W. F. Abercrombie, Howard College.

Laboratory reared larva of the Japanese beetle (*Popillia Japonica Newman*) were used. The larval period consists of three instars separated by two molts. The length and width of the head capsule were measured, to the nearest one hundredth of a millimeter by means of a vernier caliper, at the following stages: (1) Within twenty-four hours of hatching; (2) just before the first molt; (3) within the first twenty-four hours following the first molt; (4) just before the second molt; (5) within the first twenty-four hours following the second molt; (6) the full grown larva (six weeks after the second molt). There was no overlapping of the measurements of one instar with those of another. The average measurements for the first, second, and third instars were: For length, 0.71, 1.30, 2.16; and for width, 1.19, 1.94, 3.07 respectively. Dyarian ratios were calculated by dividing the respective measurements of one stage into those of the preceding stage. These ratios were found to be 0.57 for length and 0.63 for width of the head capsule. They are similar to those of Dyar (1890) and other investigators. The reciprocal of Dyar's ratio, sometimes used, was 1.77 for length, and 1.22 for width of the head capsule.

Dyar's ratio can be employed for calculating the length and width of the head capsule of the Japanese beetle if the size of the head at one stage is known. It was found that the calculated values agree within one tenth millimeter with the observed measurements. This agreement seems sufficient to make the application of Dyar's law valid.

PLANTS CAUSING HAY-FEVER IN ALABAMA

— Clarence K. Weil, M.D., Montgomery.

The many wind-pollinated plants are present in the State of Alabama, only a few have proved to be responsible for hay-fever. In an analysis of 203 cases, the pecan-hickory group was responsible for 25 cases, the elm for 1, the oak for 2, the grasses for 29, the artemesias for 1, the marsh elder for 1 and the ragweed for 85. The cause of 58 cases with symptoms between May 15th and the latter part of September is still undetermined despite extensive testing with pollens, plant hairs, animal emanations, dusts, insect scales and moulds. The following tables give the dates of pollination of those plants which have caused hay-fever (Table I) and of others that are wind-pollinated but which have not in our experience been responsible for symptoms (Table II). An urgent plea is made for the cooperation of botanists throughout the state in searching for the pollen responsible for symptoms in this large group of patients.

TABLE I

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Elm		xxxx	xxxx	xx								
Oak			xxxx	xxx								
Hickory			xxx	xxx								
Pecan				xx	xx							
Black												
Walnut					xxxx	xx						
Grasses*			xxxx	xx								
Cockle- bur								xx	xxxx	x		
Marsh elder									xxxx	xx		
Ragweed									xxxx	xxx		

*Blue grass begins to pollinate about the middle of March and continues for 6-8 weeks. Rye grass, the usual winter lawn grass begins early in April. In May, Bermuda grass, Johnson grass, the fescues, paspalums and panic grasses start to bloom and continue to pollinate until the latter part of September. In July the fox-tails, smut grasses and gamma grasses begin to pollinate. Toward the latter part of September the brome grasses start to pollinate and continue until the first frost.

TABLE II

Species	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Cypress		xx xxx										
Alder		xx xxx										
Red Cedar	xxxx	xx										
Hazelnut			xxxx									
Ash		xx	xxxx									
Pine			xxxx	xxxx								
Mulberry			xxxx	x								
Poplar & Cottonwood			xxx	xxx								
Sycamore			xxx	xxxx								
Sweet gum			xx	xxxx								
Hop-												
Hornbeam				xxxx	xxx							
Willow				xxxx	x							
Birch & Beech					xxxx							
Ironwood					xxxx	xx						
Hackberry				xx	xx							
Osage												
Orange				xxxx								
Maple				xxxx								
Plantain					xxxx	xxxx	xxxx					
Mimosa					xxxx	xxxx	xx					
Rumex					xxxx	xxxx						
Amaranth						xxxx	xxxx	xxxx	xxxx	xx		
Artemisia							xxxx	xxxx	xxxx	xx		
Chenopods							xxxx	xxxx	xxxx	xx		
Kochia							xxxx	xxxx	xxxx	xxxx		
Ulmus												
Serotina								xxxx				
White Cedar											xxxx	xxxx

LEUCOCYTOSIS IN EXPERIMENTAL ANIMALS IN RESPONSE TO INJECTIONS OF COLLOIDAL CARBON

—L. E. Starr, Auburn Polytechnic Institute.

Colloidal carbon preparations have been recommended to increase the number of leucocytes and thus aid in the treatment of disease.

In this project, three carbon preparations were employed: (1) Commercial India Ink, (2) Kollo-Karbo, a commercial preparation containing 0.014 grams of suspension, and (3) Carbon prepared from sucrose containing 0.012 grams per cc. of suspension. Rabbits and guinea

pigs were injected intravenously and intraperitoneally with these products.

The injection of all these products in individual animals resulted in a very similar cellular response regardless of the method of injection; although, India Ink gave the greatest percentage and actual increase in leucocytes. The increase was manifest within three days following the initial injection and frequently remained fairly constant thereafter regardless of subsequent injections. The mentrophiles and monocytes showed the greatest increase, most of which contained carbon particles in their cytoplasm.

Tissue sections from tissues of rabbits injected intravenously showed carbon particles in the reticulo-endothelial system of the lungs, spleen, liver, bone marrow, and lymph nodes. The lungs were congested, and the kidney liver showed cloudy swelling and degeneration.

The injection of colloidal carbon or suspensions of carbon stimulates leucocyte production and probably their phagocytic activity. From a practical standpoint, the intravenous use of carbon has been shown to have a detrimental effect on certain organs and tissues of experimental animals. Intraperitoneal or intramuscular methods appear to be safer with probably comparable results.

REDUCTION OF EXPERIMENTAL POLYCYTHEMIAS BY LIVER ADMINISTRATION

—John Emerson Davis, University of Alabama School of Medicine.

The basal erythrocyte numbers and hemoglobin percentages of four dogs were increased by the daily running of two and a half miles on a motor driven treadmill for a few weeks. In seven dogs, experimental polycythemia was induced by the daily oral administration of 2 mgm. of cobalt, as cobalt chloride, per kgm. of body weight. The increases in red cell numbers amounted to about 20% in all dogs.

In spite of continued stimulation of the hematopoietic tissue by exercise or cobalt, the daily feeding of 75 grams of whole hog or beef liver promptly reduced the erythrocyte numbers of all of the exercised dogs and six of the seven cobalt fed dogs to or below their normal values. The reticulocyte percentage, which was observed in three dogs, was increased 200 to 300% by cobalt feeding and reduced by about the same amount when liver was fed in addition. The erythrocyte counts and reticulocyte percentages remained depressed throughout the periods of liver feeding (varying from 6 to 28 days) and rose to polycythemic levels promptly upon cessation of liver administration. Leukocyte counts remained fairly constant throughout.

The daily intramuscular injection of 0.5 cc. of liver extract into two polycythemic (exercise) dogs and into two polycythemic cobalt-fed dogs caused significant (12 to 20%) decrease in the red cell counts which returned to polycythemic levels soon after discontinuation of liver extract injections.

The daily oral administration of 5 grams of stomach extract (Ventriculin) and of anti-anemic liver extract heated during preparation did *not* reduce significantly the high erythrocyte counts of three dogs which received daily treadmill exercise.

These results may be interpreted by the postulation of a liver hormone, quite distinct from anti-anemic principles, which has the function of depressing the hematopoietic activity of the red bone marrow.

PRELIMINARY OBSERVATIONS ON THE MORPHOLOGY OF MICROFILARIA IMMITIS

—R. L. Mundhenk, Auburn, Alabama.

In the course of a series of haematological examinations of dogs made by R. L. Mundhenk, W. M. Howell and J. E. Greene, the following observations on the larvae of *Dirofilaria immitis* (Leidy, 1856), either unreported in or at variance with available literature, have been made:

a. Reported as exhibiting a distinctly nocturnal periodicity, no periodicity has been noted in the occurrence of the larvae in the blood stream.

b. Check of Fulleborn's measurements of various fixed points in the larvae from the cephalic extremity, observed to be at variance with the literature.

c. Segmented appearance, noted.

d. Absence of sheath definitely observed.

e. Presence of mouth parts, consisting of frustro-conical, protrusible, tube-like structure, noted.

f. Presence of definite series of markings on cephalic extremity, noted.

g. Presence of hook-like, chitinous spine located dorso-medially on cephalic extremity, noted.

h. Previously unclassified as to whether feeding or non-feeding, definite feeding activities observed.

Suggested as worthy of major investigation because of reported occurrence in man and its relationship to *Wuchereria bancrofti*, in incidence of which in man, Virginia, South Carolina and Alabama, in the order named, lead the United States.

MITOTIC BEHAVIOR OF DISTAL CHROMOSOME FRAGMENTS IN THE NEUROBLASTS OF THE GRASSHOPPER EMBRYO

—J. Gordon Carlson, University of Alabama.

In their mitotic behavior X-ray-produced distal chromosome fragments, which lack kinetochores, resemble normal chromosomes in several respects. (1) They usually lie in or very close to the equatorial plane at metaphase. (2) The beginning of anaphase separation of their chromatids is coincident with that of the normal chromosomes. (3) They come in contact with the spindle later, however, than the normal chromosomes. (4) Their sister chromatids frequently move toward opposite poles to be included at telophase in different daughter cells. This suggests that the functions of kinetochores are mainly to synchronize the anaphase separation of chromatids and to insure their equal apportionment to the daughter cells, and not primarily to effect their anaphase separation. Protoplasmic streaming and elongation of the central spindle during mitosis doubtless account largely for the metaphase-telophase movements of these fragments.

An hypothesis, based on the assumption that broken ends of the chromatids of both distal and proximal fragments fuse *inter se*, is suggested to account for three classes of early anaphase fragments and for chromatin bridges. Regarding distal fragments 1) V's result from fusion of the broken ends and separation of the true ends of terminal fragments, 2) rings result from fusion at the two broken ends and non-terminal separation of intercalary fragments, and 3) two rods result from fusion of

two terminal fragments at their broken ends to form a fragment with two true ends, so that separation is complete. Proximal fragments form chromatin bridges, owing to fusion of sister chromatids at their broken ends.

BOTANICAL DISCOVERIES AND WRITINGS OF CHARLES MOHR

—Roland M. Harper, Geological Survey of Alabama.

Dr. Charles Mohr, who was born in Germany in 1824, and died in Asheville, N. C., in 1901, made his home in Mobile from 1857 to 1900, or more than half his life. He was a pharmacist by profession, and an enthusiastic botanist, and doubtless contributed more to our present knowledge of the flora of Alabama than any other man. He was especially interested in trees, and was several times commissioned by the United States government, and various railroad companies, to report on the forest resources of parts of Alabama and neighboring states. He discovered about thirty previously unknown species and varieties of plants, several of which were named after him.

He did not begin to write for publication until he was nearly fifty years old, but during the remainder of his life published about 75 magazine articles and bulletins, aggregating about 1800 pages. His greatest work, the "Plant Life of Alabama", a book of over 900 pages, published by the government and state jointly, came out two weeks after his death, and is still a standard reference work.

MORTALITY STUDIES ON RATS AFTER LETHAL DOSES OF *TRICHINELLA SPIRALIS*

—Reed O. Christenson, Alabama Polytechnic Institute.

Animals suffering lethal cases of trichinosis show a bimodal mortality curve corresponding to the tissue invading stages of the parasite. When infested tissue is fed the larvae are liberated by the gastric juices. They migrate to the intestine and by the end of the second day have reached maturity. They mate and the females begin to penetrate the mucosa. Mortality begins at this point and rises to a peak by the fourth day; by the seventh day it has declined. Of 41 rats dying during this period; 12 died the third day, 16 the fourth, 4 the fifth, 2 the sixth, 3 the seventh, and 4 the eighth.

By the end of the seventh day the adults in the intestine appear to cause little inconvenience. At this time the larvae are entering the blood stream and there is a consequent increase in the eosinophil cells. In some of our human records as high as 84% were found as compared with the normal 3 to 4% of the leucocytes.

By the fifteenth day the larvae are in the muscles in sufficient quantities to cause considerable inconvenience and pain. Oedema is an accompanying symptom. Again the mortality curve goes up. Of the 46 animals dying during this critical period; 4 died the fifteenth day, 4 the sixteenth, 2 the seventeenth, 4 the eighteenth, 6 the nineteenth, 8 the twentieth, 8 the twenty-first, 7 the twenty-second, 2 the twenty-third, and one the twenty-fourth. Animals enduring longer usually recover although occasionally deaths occur later.

POLYGYRA HOPETONENSIS (SHUTTLEWORTH) AN ATLANTIC COASTAL MOLLUSK IN BIRMINGHAM, ALABAMA

—Allan F. Archer, Alabama Museum of Natural History.

Polygyra hopctonensis (Shuttleworth), one of the three-toothed Polygyrae, has not hitherto been recorded in Alabama. Its normal range is the Atlantic coastal plain from northern Florida to the eastern shore of Maryland. The only closely related snail occurring in Alabama is *Polygyra fallax vannostrandi*. I first noted *P. hopctonensis* in Birmingham in 1935, and in Decatur in 1937. Since this species tends to be urban, it is easy to see how it could be readily introduced into cities where it does not already occur. Very probably it was brought into Birmingham on plants sent from one of the Atlantic coastal cities, such as Savannah or Charleston.

Of the fifteen species of land mollusks which I have noted in the urban portion of Birmingham all except *P. hopctonensis* are native to the locality. It is, however, missing from the list of eleven species recorded from the suburban area. Its habitats are the roots of grasses and weeds, under boards, cement blocks, and bricks. It is common on sloping lawns and in vacant lots, and is also present in gardens, where it feeds on decaying plant material. Other urban species occupying similar habitats are:

Anguispira alternata, *Deroceras laeve campestre*, *Gastrocopta armifera*, *contracta*, *procera*, *Harvaia minuscula*, *Polygyra appressa perigrata*, *Polygyra inflecta*, *thyraoidus*, *Pupoides marginatus*, *Retinella indentata paucilirata*, *Zonitoides arboreus*, *demissus*, *intertextus*.

PREPARATION AND CARE OF RAW PELTS IN ALABAMA

—F. S. Barkalow, Jr., Alabama Polytechnic Institute.

Mammal skins, aside from their commercial value, are invaluable in the laboratory for studies on taxonomic relationships, and also for comparison in making stomach analyses of predatory species. In wildlife research a good workable collection of study skins is essential and these, to render satisfaction, should be prepared with utmost care, using standard taxidermic methods.

In preparing a mammal skin the animal is measured, skinned; the legs and tail are wired; a body filler of excelsior or cotton is inserted and the specimen sewed up. The skin is labeled and pinned out in a reclining position to dry.

The extraneous tissues can be removed from the skeleton by exposing to dermestid beetles or by cooking with sodium sulfide. If possible the skull with complete dentation should accompany each skin.

Furs should be washed and cleaned before stretching, using one of the standard five types of handling (depending on the species Barkalow, 1938).

There are few data on the incidence of fur animals in Alabama. Twenty-one species, consisting of twenty-four geographic races are indigenous to this area. The gestation period of over half of these is imperfectly known. Two muskrats, *Ondatra zibethicus zibethicus* (Linn.), and *Ondatra vicivalicia* (Bangs) are apparently holding their own, possibly increasing. The large striped skunk, *Mephitis nigra* (Peale and Beauvois), the Florida skunk, *Mephitis elongata* (Bangs), and the otter, *Lutra canadensis canadensis* (Schreber) are facing extinction. Few Alabama fur-bearers are protected by closed seasons of sufficient length.

THE POCOSIN OF PIKE COUNTY

—Roland M. Harper, Geological Survey of Alabama.

The "pocosin" is an area of about 100 acres of upland hardwood forest, with about half its trees and shrubs evergreen, about six miles east of Troy. It is essentially the same as the sandy "hammocks" of southern Georgia and northern Florida.

This pocosin has been known to scientists for about eighty years, and some of them, having little or no acquaintance with similar vegetation in Georgia and Florida, have been puzzled to account for it. But to the writer, who first visited it in 1912, the explanation is simple enough. The large proportion of evergreens is due to the poor sandy soil, which does not provide enough plant food for a new crop of leaves on all the trees every year. And the prevalence of hardwoods instead of pines is due to protection from fire afforded by Walnut Creek on one side and sand-hill vegetation, too sparse for fire to travel through, on three sides.

For most pines, especially the long-leaf, are well protected from fire by their thick bark, while most hardwoods are much more sensitive. So fire protection favors hardwoods over pines, which do not germinate readily in shade or humus. And if all fires in this part of the country had stopped a few hundred years ago our long-leaf pine forests would probably have been replaced by forests much like the pocosin.

 POTASH SHALE AS A SOIL BUILDER

—Harry C. Heath, Huntingdon College, Montgomery.

This was a plot experiment in the field with the financial assistance of the Elizabeth Thompson Science Fund.

Crushed potash shale from Cartersville, Georgia and Ashland Schist from Sylacauga, Alabama were used. The former contained 8.4% and the latter 6% K_2O .

The .6 plots were located in Leaf Fine Sandy Loam which was deficient in potash. They were laid out one square rod each in series of four, one a control without potash fertilizer; one treated with commercial potassium chloride at the rate of 100 lbs. per acre; one with raw pulverized shale at the rate of three tons per acre and the last with three tons of shale roasted with 15% of calcium sulphate.

Corn and cotton were grown in the summer and winter legumes during the winter.

Results were taken of the weights of the crops harvested and of the percent of the K_2O in the leaves.

The three tons of Cartersville shale contained about enough potash to double the content in six inches of top soil, but at the end of three or four years cropping, the top soil tested contained approximately the same percentage as at the beginning before potash shale was added.

The shale caused approximately one half as much increase in weight of crops as the KCl , but the roasted shale increased the potash content of the leaves, in some instances, to almost equal to that of KCl . The plants growing in raw shale plots were always considerably lower in potash content.

The results seem to indicate that these shales could be used profitably only in case of an emergency when the present supply of commercial potash were cut off.

STIMULATION OF GERMINATION OF CROTALARIA SEED
BY SCALDING; OPTIMUM TEMPERATURE AND DURA-
TION

—J. F. Duggar, Alabama Polytechnic Institute.

The annual legume *Crotalaria spectabilis* has proven to be a very effective means of building up soil fertility. One obstacle in its general use has been the low germination of its seeds. This is being overcome by scarifying (scratching) them, usually in an expensive commercial machine.

Among other means of effecting greatly increased germination at minimum cost the writer has found scalding to be especially satisfactory. To raise the germination percentage from the usual 5 to 15 for untreated seed to above 90 per cent, only 10 minutes was required when the water was maintained at either 170 degrees F. or 180 degrees F.; and 20 minutes at 160 F.

At 135 F. scalding for one hour was only slightly helpful, and scalding for two hours was required to bring germination even up to 79 per cent. At 150 F., germination was raised to 95 and 97 per cent, by scalding for 20 and 40 minutes respectively. Definitely depressive to germination were 150 F. for one hour or longer, 160 F. for 40 minutes, and 170 F. for 20 minutes.

From repeated tests the writer recommends that farmers scald *crotalaria* seed at about 150 degrees F. for about 20 minutes, and avoid planting such treated seed in soil that is extremely dry.

BY TITLE

HOUSE DUST IN TREATMENT OF ALLERGY

—Ralph M. Clements, Tuscaloosa.

WHITE FRINGED BEETLE (*NAUPACTUS LEUCOLOMA*) IN
ALABAMA

—J. M. Robinson, Alabama Polytechnic Institute.

SECTION II

CHEMISTRY, PHYSICS AND MATHEMATICS

A MODIFIED COMBUSTION APPARATUS FOR CARBON
AND HYDROGEN DETERMINATIONS

—George Palmer, University of Alabama.

A modification of the Fischer combustion apparatus is used. The most expensive part of the carbon and hydrogen determination apparatus is the triple block of electric furnaces which alone cost \$210.00, and

the preheater which costs approximately \$50.00. We have required the students to build their own electric furnaces to replace the three heating units. The preheater may likewise be home-made.

These electric furnaces are made by winding 24 gauge chromel wire around vitreosil tubes (4.1 cm. outside dia., and 3.5 cm. inside dia.) with a layer of asbestos cord between the wires. The furnaces are 11.5 cm., 17.8 cm., and 22.5 cm., in length. For economy, a silica combustion tube 76.5 cm. in length (2.0 cm. inside dia. and 2.6 cm. outside dia.) is used. It is more convenient to use a transparent fused quartz combustion tube.

The chief difference in the procedure for the determination of carbon and hydrogen consists of sliding these home-made electric heating units over the combustion tube, whereas the regular hinge type electric furnaces are merely opened. These furnaces last for many determinations.

The above apparatus with minor modifications of the original Fischer apparatus has been found to give accurate results even when a sample as small as 0.04 gram is used. For example, four analyses of saccharin by a student averaged 45.81% C and 2.74% H while the theoretical values are 45.85% C and 2.75% H. Less expensive apparatus should mean that larger classes may be given this essential training.

A DISTRIBUTION FUNCTION FOR COSMIC RAY IMPULSES

—Eric Rodgers, University of Alabama.

In a recent experiment, 20,000 counts from a G-M counter were recorded on a moving strip of paper. The counter was shielded and most of the counts were due to cosmic rays. The results were analyzed in two ways. The first analysis consisted in determining the distribution of the counts in equal time intervals as determined by measuring off equal lengths on the paper. In the second analysis, the time elapsing between consecutive counts was determined for 15,000 of the counts. An attempt was then made to fit the data into some well known probability distribution function. Of the various distribution functions tried, it was found that the data fit very nicely into a Poisson distribution. A criterion due to Pearson shows that if the Normal Distribution Law applied to such events, the probability of obtaining a sample fitting it as badly as the data did is less than one in a million. This is rather significant in view of the fact that many writers assume a normal distribution in computing probable errors. On the assumption of the Poisson law, the Pearson criterion shows that approximately 50% of the time the fit would be as bad as that represented by the data.

FUEL BRIQUETTES FROM ALABAMA LIGNITE BY DESTRUCTIVE DISTILLATION AT LOW TEMPERATURES AND BRIQUETTING THE RESIDUE WITHOUT A BINDER

—C. A. Basore, Alabama Polytechnic Institute.

The object of this investigation is to call attention to the presence of the Alabama lignite and, if possible, to find a method for the profitable utilization of this material.

As a result of this investigation, a process has been developed for the manufacture of a good grade fuel briquette involving the following steps:

(1) The raw lignite is air-dried and then preheated or subjected to low temperature distillation at a temperature sufficient to remove practically all the water and much of the volatile matter of the lignite. As a result, the weight is decreased about one-third, much of the smoke is eliminated and the heating value of the lignite is appreciably increased.

(2) The preheated lignite residue is then ground, moistened with water and briquetted hot without the addition of a binder. The resulting briquettes are firm and strong enough to withstand rough handling, and they resist weathering to an extent which would permit shipment and storage if protected from direct rainfall.

(3) The optimum conditions for carrying out the various steps in the process have been determined and a study made of the probable large-scale equipment and cost of manufacture.

(4) Judging from the apparent quality of the briquette and the estimated cost of production, the briquettes have considerable promise.

NOTE—Alabama lignite deposits have not been developed sufficiently for the variation in the lignite from different localities to be determined. Apparently there is considerable variation in Alabama lignite. While the samples employed for this work are believed to be representative of much of the lignite, the process described above is not necessarily applicable to all Alabama lignites. Preliminary briquetting tests should be carried out on an unknown deposit in order to determine if this method is applicable.

GONIOMETRY STREAMLINED

—W. A. Moore, Department of Mathematics, Birmingham-Southern College.

The name goniometry is used by certain recent writers in preference to trigonometry for reasons which are apparent in consideration of the derivation of the words. Goniometry is the branch of mathematics embracing the theory of functions of an angle. Trigonometry is the application of this theory to the solution of triangles.

In its ideal form goniometry embodies a distinct, and logically complete set of formulas and generalizations exhibited in a sequence as rigorous and beautiful as Euclid itself. In its more common manifestations, however, it falls far short of this ideal.

In this paper an examination is made of the logical foundations of goniometry and recommendations are made for an approach which is different from, and more direct than the conventional one. As an illustration of the difference, two definitions follow:

Conventional: The sine of an angle is the ratio of the ordinate of some point on its terminal side to the radius vector of that point.

Suggested: The sine of an arc is the ordinate of its end point.

It is to be noted that in each case the word ordinate implies a definite Cartesian Coordinate system with not only a definite origin but also a definite unit of measure. In the latter case the unit of measure is the radius of the arc. The cosine and the tangent are defined in a manner similar to the sine and all other functions are defined in terms of these three.

It is confidently claimed that these new definitions form a more direct and natural approach and will contribute to an ideal expression of the theory.

AN INVESTIGATION OF SOME LITTLE KNOWN REACTIONS OF CALCIUM CARBIDE

—B. F. Clark, Birmingham-Southern College.

A British patent obtained by M. G. Corson outlines a purported method for the production of symmetrical acetylenes by the action of calcium carbide on alcohols, phenols, or chloro-phenols in an autoclave at 150-300°.

Believing that such reactions might take place under less rigorous conditions we first checked for reaction at room temperature, then at the boiling point of the organic compound used.

Methyl alcohol reacted slowly at room temperature while ethyl, n-propyl, iso-propyl, n-butyl, iso-butyl, sec-butyl, ter-butyl, iso-amyl, benzyl, and tetrahydrofurfuryl alcohols reacted readily at their boiling points, in all cases giving acetylene and the corresponding calcium alcoholate. In no case was a symmetrical disubstituted acetylene found.

Cholorbenzene was also tried, not only at its boiling point, but also in sealed tubes heated as high as 250° for 10 hours without any reaction taking place whatsoever. Benzyl chloride reacted readily on only gentle heating with calcium carbide, evolving HCl and heaving a low-melting resinous mass that defied analysis.

Butyl bromide was dropped onto calcium carbide heated to 250° in a special flash-distillation apparatus with only a faint evolution of acetylene.

Acetic, propionic, butyric, and lactic acids directly and benzoic acid dissolved in benzene all reacted readily to form acetylene and the calcium salt of the corresponding acid.

Bodroux and Taboury reported that acetone reacts with calcium carbide to form mesityl oxide. Our results bear out their findings and we are now attempting to secure larger yields. At present we obtain 30-35% mesityl oxide. A considerable amount of higher products is formed, boiling from 170-360°. Only phorone has so far been isolated and identified in this high-boiling fraction.

AN IMPROVED METHOD FOR PREPARING 6-AMINOQUINOLINE AND ATTEMPTS TO CONVERT IT TO THE 6-HYDROXY COMPOUND

—G. W. Hargreaves and A. B. Marshall, Alabama Polytechnic Institute.

Aminoquinoline has previously been obtained by reducing the corresponding 6-nitro compound with stannous chloride, decomposing the precipitated tin double salt with hydrogen sulfide and precipitating the amino compound with alkali. The yields by this method are only 45-48%. By decomposing the tin double salt with alkali and extraction with ether, the yields have been raised to 80-84%. In an attempt to convert the amino compound to the corresponding hydroxy compound, the diazonium solution of the former was slowly added to boiling 6N hydrochloric acid. Nitrogen was evolved and upon cooling the solution was neutralized. The precipitate formed proved to be a red tarry mass, difficult to filter, and upon standing resulted in a plastic like substance with a deep red color. No melting point could be obtained for the tar like substance. This method was varied employing 5N HCl, 3N HCl, 1N HCl, 0.5N HCl, 0.1N HCl and finally distilled water but the results were the same in every case. Likewise, an attempt to substitute the chloro group employing a modification of the Sandmeyer reaction was unsuccessful.

THE USE OF POLARIZED TUNGSTEN ELECTRODES IN ACIDIMETRY AND ALKALIMETRY

—James L. Kassner, University of Alabama.

Polarized tungsten electrodes have been used to indicate the equivalence point in acidimetry and alkalimetry reactions. The potential change at the end point occurs at a pH of about 8, and varies from 120 to 380 mv. when one drop of 0.1 N. acid or alkali is added to a total volume of 200 ml of solution. The magnitude of the break depends upon the current density of the polarizing current. When a platinum anode is substituted for the tungsten anode no potential change is obtained at the end point. However, when a platinum cathode is substituted for the tungsten cathode a potential change is obtained at the end point. This showed that the potential change at the equivalence point is due to the tungsten anode and not to the cathode. Measurement of the single electrode potential of the two tungsten electrodes during the course of a titration confirmed the above conclusion.

This electrode couple has been found to be the most dependable couple ever tried in this laboratory for acidimetry and alkalimetry and is the only polarized couple that can be used for both reactions successfully. After a few days of use the luster of the cathode is destroyed. It turns a dull black. This was also observed by Britton and Dodd. (J. Chem. Soc. 53, 829-831 (1931)). So far no attempt has been made to determine the composition of this coating. The electrodes can be laid away and later put into use again without any pretreatment, provided the polarity is not reversed.

This electrode couple has been used in the titration of all of the common strong acids and acetic acid and vice versa. It has also been applied to the determination of very small amounts of carbon dioxide in the atmosphere. The carbon dioxide is absorbed in 1/50 N. Ba (OH)₂ solution in a specially designed cell which has the tungsten electrodes sealed in the side. The excess Ba (OH)₂ is then titrated with 1/50 N. HCl. Since the volume of the solution in the special titration cell is so small (4-6 ml.), the potential change at the end point is exceptionally large, 300-500 mv. Titrations can be performed with 0.02 N. HCl to an accuracy of 0.005 ml without any difficulty.

This work was done with the Cenco-Kassner titrometer.

BY TITLE

STATISTICAL, METEOROLOGICAL AND CLIMATOLOGICAL DATA AVAILABLE FOR SCIENTIFIC WORKERS

—E. D. Emigh, Weather Bureau, Montgomery.

THE HOROCYCLE AND THE ABSOLUTE UNIT OF LENGTH

—Henry Gerhardt, Mobile.

SECTION III

GEOLOGY, ANTHROPOLOGY AND ARCHEOLOGY

SOME "ACID TESTS" FOR STATES

—Roland M. Harper, University, Ala.

Many attempts have been made, especially in recent years, to rate the civilization of different countries, states, counties and cities by means of various kinds of statistical criteria. But most of the statistics used have dealt with wealth and other things correlated with it, and some have been relatively meaningless, or capable of different interpretations. And the fact that an intermediate condition is sometimes better than either extreme is often not recognized. Some of the criteria, for example those relating to health, morals and intelligence, may put the communities considered in quite a different order from the wealth rating; and their relative rank in any one particular may also change from one decade to another. Most such studies that have been made in the United States have lumped the races together, thus giving the southern states a low rating in wealth and other things correlated with it.

Among the different lines in which communities can be rated are health, intelligence, morals, wealth and contentment. The following observations relate to states only, and to the white population only, unless otherwise indicated.

Health is indicated by birth and death rates, infant and maternal mortality, longevity, etc. The differences between states in death rates and longevity are now rather small. But the expectation of life has

long been greater in rural districts than in cities, and that gives the South an advantage over the North.

The measure most commonly used for intelligence—or the lack of it—is illiteracy, but that is rather crude, and it indicates opportunity about as much as it does intelligence. (It is less everywhere now than it was a few decades ago, though it is very doubtful if the average intelligence of the population has increased.) It is generally less in cities than in the country, and less in commercial centers than in manufacturing cities, on account of the numerous unskilled laborers in the latter, whose work requires no education. Whites in southeastern cities generally show much less illiteracy than in northeastern ones, and the western states still less, for this reason. Other measures of intelligence, or culture, or vice versa, are the ratio of Who's Who people, scientists, inventors, college students, morons, magazine readers, libraries, etc., to the population. The northeastern states lead in most of these things, but less now than formerly, on account of their large factory element. The newer western states have produced comparatively few noted persons yet.

Morals are indicated roughly by statistics of prisoners, lawyers, divorce, size of families, proportion of bachelors, and vote on prohibition. In these respects the best states are in the Southeast and the worst in the West; and rural districts make a better showing than cities.

Wealth is indicated by property assessments, farm values, urban population, automobiles, gasoline consumption, telephones, radios, bank deposits and clearings, etc. In most such statistics the races are not separated, but taking state averages, it is fairly evident that the poorest whites are in the South and the richest in the West.

Contentment is perhaps indicated best by the suicide rate, and indirectly by the divorce rate. Whites commit suicide oftener than Negroes, men more than women, city people more than country people, and all classes more now than formerly. Suicide is most prevalent in the West and least in the South (even when whites only are considered); and the same can be said of divorce, if we make allowance for different laws in different states.

ARCHEOLOGICAL EXCAVATIONS IN THE TENNESSEE VALLEY REGION OF ALABAMA

—David L. DeJarnette, Alabama Museum of Natural History, University.

During the past four years the Alabama Museum of Natural History has cooperated with the Tennessee Valley Authority, and the Federal Relief agencies, in the excavation and study of material from the archeological sites lying within the areas flooded or to be flooded by dams along the Tennessee River.

This work and preliminary study traces the development of these people from the early primitive fishing and hunting stage to the more complex cultures of the people who occupied the region when discovered by the first white settlers in the valley.

The large shell mounds are the best index in the life and customs of these people during this time. Numerous shell mounds have been

excavated and each reveals its story, beginning with the crude cultures of the people who began construction of the mounds, on through to the complex and highly developed culture of the people who heaped the last shells upon the present surface.

Material found in the basal portion of these shell mounds gives the record of the first inhabitants. These people depended chiefly upon the river for their subsistence, however, occasionally animal bones were found, indicating other food was taken besides that from the river. Of the river food, the principal diet must have been the mollusk, since the shell of this animal goes to make up about 90 per cent of the contents of the mounds. (These mounds are accidental accumulation of shells which have been discarded from the kitchen and in some cases cover several acres and reach a thickness of 20 to 30 feet). The shell fish was probably taken by hand from the shallow shoals of the river, and the fish harpooned with a pointed bone spear. The absence of pottery in these lower shell levels indicates a lack of knowledge of the manufacture of this ware. Crude primary flint chipping was done on a small scale, but the projectile point of flint had not been developed. The bone point was extensively used. Few burials were found in the lower levels, but all were of the extended flesh type.

The next cultural change in the shell mounds was the development of the art of flint chipping. Large bands of flint chips and blanks extended over the entire area of the mounds at this level. The development of the flint point saw a decline in the use of bone. Other than this there was very little change in the habits and customs of the people. Cremation of the dead was practised during this time.

After the development of flint the third and major cultural change was the introduction of pottery, evidence of which is found in the top several feet of the shell mounds. The pottery found is made up in several wares and may evolve into several cultural divisions after more detailed study.

Besides the cultures in the shell mounds, investigations have shown two other cultures.

The first of these is the earth mound burial complex. This culture is evidenced by the small conical earth mounds which were constructed over tombs made of logs and containing the dead. Copper, galena and greenstone were materials from which these ornaments and tools were fashioned. Because of the extensive use of copper and galena by these people, they have been given the name of "Copena."

The second culture other than the shell mound, is the earth mound dwelling complex. These mounds are usually large truncated pyramidal structures used as a base for house construction. The excavations of these earth mounds reveal the remains of the houses built on various levels during intervals in the construction of the mound. These houses were usually rectangular in shape and were built of small logs placed vertically in trenches to form the walls and with horizontally placed logs across the tops of the wall to form the roof.

LATE ARCHEOLOGY

—Peter A. Brannon, Department of Archives and History, Montgomery.

Believing that archeological investigations which result in the finding of continental and early Colonial objects associated with the tools and cultural things ascribed to pre-historic people is technically a phase of scientific research, the writer stated that his paper was based on the finding of these things on old Indian town sites and abandoned early historical points in the Tallapoosa River country. Indian traders were coming into this country before 1700 and the things which they brought to these primitive people were so prized that they were buried by them, or with them, and preserved as were their other cultural objects. The speaker illustrated beads, bottles, jugs, scissors, knives, mirrors, and such things and made the comparison of these trade things with the aboriginal ones. He pointed out that the scientist of the future will reconstruct a conception of our present cultural attainment from our dump heaps, garbage piles, old wells, cisterns, and such refuse receptacles, therefore we certainly must be permitted to accept the findings of these discarded, or if we may look at it from another viewpoint, preserved evidences of two hundred years ago, when a scientific analysis of these things is permissible, and they should not be treated wholly as historical finds.

The illustrative material demonstrates to an extent the height to which art had reached at the beginning of the sixteenth century both in the industries and in reference to those things of an economic nature.

BUTTERFLY TRAVELERS, WITH SPECIAL REFERENCE TO THE MIGRATING YELLOW BUTTERFLY, *CATOPSIS EUBULE*, PERHAPS BETTER KNOWN AS *CALLIDRYAS EUBULE*. INFORMATION DERIVED FROM OBSERVATIONS MADE DURING A PERIOD OF OVER EIGHTEEN YEARS

—Patrick H. Smyth, Meteorologist (Retired).

In the May, 1937, issue of the National Geographic Magazine, Dr. C. B. Williams, Head Entomologist, Rothamsted Experimental Station, Harpenden, England, made an earnest request for information regarding the migration of butterflies in any part of the world, on land or sea. In compliance with this request, there was forwarded to Dr. Williams a copy of a record of observations on the migrating yellow butterfly, made during a period of eighteen years, 1920-1937, inclusive, and subsequently several boxes of butterflies were forwarded to Dr. Williams for the purpose of dissection. In addition to the specimens sent by the writer, Mrs. Mason of Snowdoun, Alabama, sent to Dr. Williams nine species of butterflies, all known migrants, which is most remarkable when it is considered that at present only about 5% of the butterflies of the United States are known to be migrants.

During the latter part of the summer and through the autumn of 1937, many Gulf Fritillaries (*Dione vanillae*), a few Monarchs, also called the "Milkweed butterfly (*Anosia plexippus*), and the usual num-

ber of yellows, were observed flying toward the southeast. Although the southeastward flight of the Gulf Fritillary was suspected, it had not been definitely determined.

The *Catopsilia eubule* is undoubtedly of southern distribution, and in reality it may be said to be tropical, despite the fact that it is found as far north and northwest as Wisconsin and Nebraska, and northeastward to New England, while southward it takes its flight to Patagonia.

A close watch for the yellow migrants on the so-called return flight, beginning in mid-winter and continuing through spring and sometimes into June, for the purpose of ascertaining whether the male and female, or only the female, return by way of Alabama en route to their northern haunts. So far this spring only two (2) yellow butterflies have been seen, one on March 4, and the other on April 20; both were full-size and they were flying toward the west. They were much more numerous during the spring of 1937.

GEOLOGY OF THE TROY DISTRICT

—Walter B. Jones, State Geologist of Alabama.

The Troy area is entirely in the Coastal Plain region, with the Cretaceous sediments to the north and the Eocene at, and to the south of Troy. The stratigraphic section is as follows:

	Formation	Thickness	Character
E O C E N E	Nanafalia	250'	Sand and shale, with the marl containing myriads of <i>Ostrea thirsae</i> the principal horizon. Lignite near the base.
	Naheola	175'	Mostly shale or sandy shale, fossiliferous.
	Unconformity		Period of erosion, during which bauxite, fuller's earth, ocher and clays were deposited in erosion channels in the Clayton.
	Clayton	125'	Fossiliferous limestone, with some streaks of glauconitic material.
C R E T A C E O U S	Unconformity		Period of erosion (?), formation of brown iron ore.
	Providence	50'	Sand, sparingly fossiliferous.
	Prairie Bluff	40'	Rotten limestone, similar to the Selma Chalk, fossiliferous.
	Ripley	350'	Sand and occasional marl members, abundantly fossiliferous, especially <i>Exogyra</i> , etc.
	Selma	900'	Rotten limestone, ranging from 65 to 87% CaCO ₃ . Fossiliferous in part.

Except for the unconformities, the beds were all laid down in normal succession by the waters of the Mississippi Embayment of the Gulf of Mexico. The beds dip southward about 40 feet to the mile and, so far as is known, there is no evidence of folding and faulting anywhere in the area.

METHOD OF PROCEDURE FOR A PALEONTOLOGICAL REPORT ON WELL SAMPLES

—Winnie McGlamery, Geological Survey of Alabama.

There are a few wells drilled in Alabama from year to year in the Coastal Plain, the most recent one being on the Hatchetigbee Anticline, and reaching a depth of over 7500 feet. We try to obtain sets of samples from each of these to study the subsurface geology and thicknesses of formations penetrated. The result is a paleontological report made by this department for each well from which samples are obtained. The procedure in making such a report, we thought, would be of interest.

We have considered a well starting in the Marianna Limestone, and continuing to the Tuscaloosa formation. The method of washing samples is outlined. Slides showing representative Foraminifera from each formation, from surface samples, as well as well cores, accompany the paper.

Exhibits:

1. Well cores showing characteristic lithology of some of formations.
2. A few large fossils characteristic of each formation.

STRATIGRAPHY OF THE UPPER CRETACEOUS SERIES IN ALABAMA AND MISSISSIPPI,

—L. W. Stephenson and W. H. Monroe, U. S. Geological Survey.

The Upper Cretaceous sediments of the eastern Gulf Region crop out in a crescentic band around the southwestern end of the plunging Appalachian Highlands in a belt 500 miles long and up to 75 miles wide. Their maximum thickness is estimated to be about 2,300 feet.

The Tuscaloosa formation is thickest in west-central Alabama, but thins northwestward to a feather edge in Tennessee, and thins toward the east to about 250 feet near Chattahoochee River. The Eutaw formation overlies the Tuscaloosa, from which it is separated by a major unconformity. The Eutaw thins both toward the northwest and toward the east, only the upper part being exposed in Tennessee and in Georgia. The Selma chalk overlies the Eutaw formation unconformably. It consists of nearly 900 feet of chalk in west-central Alabama, but is broken by a disconformity about 200 feet above its base, a few feet above a thin but persistent bed of hard, pure limestone. Northwestward in Mississippi the lower third of the Selma passes by merging and intertonguing into the Coffee sand; the upper third merges into the Ripley formation; and the middle third continues into Tennessee as an impure chalk unit. In the eastern part of Alabama the part of the chalk below the bed of pure limestone merges into an unnamed sand, and the part above the limestone merges into and intertongues with sand that is called Ripley. The Selma and Ripley are separated from the overlying Prairie Bluff chalk by a major unconformity. The Prairie Bluff chalk merges toward the north in Mississippi into the Owl Creek formation and toward the east in Alabama into an unnamed marine

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sand and into a shallow water sand formerly known as the Providence sand member of the Ripley formation.

The following zones have been traced through Mississippi and Alabama: The *Exogyra ponderosa* zone, which embraces the Tombigbee sand member of the Eutaw formation and the lower two-thirds of the Selma chalk and equivalent beds; the *Diploschiza cretacea* zone, a narrow zone in the Selma chalk, within and about 200 feet below the top of the *E. ponderosa* zone, traceable from Tupelo, Mississippi, to the longitude of Montgomery, Alabama; the *Exogyra costata* zone embracing the upper third of the Selma chalk, the Prairie Bluff chalk, and equivalent beds; the *Exogyra cancellata* zone, traceable throughout the area in the lower 200 feet or so of the *E. costata* zone.

Correlations with the Upper Cretaceous series of the western Gulf region will be indicated.

The distribution of the chinks indicates deposition in clear, only moderately deep water, off the southwest end of the Appalachian Highlands during much of Upper Cretaceous time; drainage from the Highlands was mainly to the southeast and northwest while the chalk was accumulating.

A LAYMEN'S VIEW OF ARCHEOLOGY: SPECIFICALLY BESSEMER MOUND EXCAVATION, 1934-1935.

—Edgar C. Horton, Birmingham Anthropological Society.

Field project of a course in Archeology; an object lesson in mound exploration. Finds not numerous, but surprising; stone floor transformed by fertile imagination to a duck effigy; inhumation of a dog, impressive reminder of man's long attachment for him. Archeology too conservative; need for more correlation and induction.

PROGRESS OF THE ARCHEOLOGICAL SURVEY OF THE WARRIOR RIVER

—Dr. Walter B. Jones, State Geologist of Alabama.

In order to get some idea of the aboriginal occupation of similar "river" counties, it was decided to cover Tuscaloosa County in considerable detail. This work was largely made possible through a grant from the National Research Council. The writer gives such time to the work as he can spare from his other duties and it is most interesting. To date, 234 aboriginal sites have been recorded for Tuscaloosa County, and there is much area adjacent to the Warrior which has not yet been covered. Little or no work has been done on the tributaries, and practically none on the headwaters beyond navigation. Along the navigable portion of the Warrior, which has been rather thoroughly studied from Lock 13 to Taylor's Ferry, 10 sites have been recorded. It is now evident that Tuscaloosa County will have more sites than any other county along the Warrior, because of its favorable position at the fall line, thus rendering life easier for the aborigines than other locations.

It is thought that a complete coverage of Tuscaloosa County will finally result in the recording of at least 600 sites, representing a wide variety of cultures from historic to prehistoric people of considerable antiquity. As far as archeological research is concerned, the Warrior River region is essentially virgin territory. Of course, much work has been carried on at Moundville, Snow's Bend, and White's Lake, from which the Moundville Culture is very well known. Some work was done at the Lon Robertson place and Moody's Slough, where the burial urn culture was studied. This culture was not hitherto known except in the Coosa-Tallapoosa-Alabama River region. The culture is definitely known to be at Foster's Ferry Bridge and at the Wilkerson Plantation, although it has not been studied at those places. It is thought that many other sites along the Warrior may prove to belong to the burial urn people.

There is no question but that the Warrior River region is one of the great complexities in aboriginal history, the interpretation of which remains largely to future research.

SECTION IV

INDUSTRY, ECONOMICS AND GEOGRAPHY

APPRENTICESHIP PLAN OF AMERICAN CAST IRON PIPE COMPANY

—S. D. Moxley, American Cast Iron Pipe Co., Birmingham

The American Cast Iron Pipe Company operates an apprenticeship system covering the trades involved in the plant whereby shop work is coordinated with technical class room work. The class room work is considered on a par with the shop training, and satisfactory completion of both phases is necessary for the advancement of the apprentice. Class room work is done under an instructor furnished by the company and during the regular working hours. The apprentice is paid his regular rate during this class room work, and is offered an additional bonus upon completion of the apprentice contract.

The company also operates a shop training course for technical graduates coming into the organization. These men serve short periods in all the basic departments of the plant. The training of the apprentice usually requires two years. During this period the man and the company have the opportunity to judge each other and to test a practical method of vocational guidance for the selection of the proper career in each case.

THE FAILURE OF COTTON RESTRICTION

—J. Allen Tower, Birmingham-Southern College.

The theory of limitation of output to meet the available demand is widely practiced in industry and in agriculture. The more successful applications of this theory have a common feature: control of the dominant proportion of the world output. This theory, as applied to cotton,

has largely been a failure. It has raised the income of the cotton farmer, but at the expense of an increasing loss of our foreign markets; before the war, the United States produced 62 per cent of the world supply, but in the crop year 1936-37 it produced only 40 per cent. Continuance of the program will increasingly lose our foreign market and force tremendous readjustments in Southern agriculture. Alternative action lies in increasing the available demand by developing new uses for cotton, in reducing the production costs through plant-breeding for better quality and higher yields and through use of a mechanical cotton picker, or through diversification and the substitution of other crops for cotton.

ECONOMICS OF FOUNDRY SAND SITUATION IN ALABAMA

—Fred B. Riggan, Stockham Pipe Fittings Co., Birmingham.

Only recently has the foundry industry had a common system of grading sand and a common language in describing sands that were offered for sale by the sand producer or that were desired by the consumer foundry. Previous to this time judgment as to the quality and condition of moulding sand was based on the feel of the particles when rubbed in the hand.

Sand producers in Alabama still use the old formula and as a result many foundries pay double or triple standard local prices in order to deal with dependable and competent sand producers.

Alabama has sands of excellent quality and offers opportunity for development in this field.

LAND UTILIZATION IN THE GREAT APPALACHIAN VALLEY OF ALABAMA

—J. F. Glazner, State Teachers College, Jacksonville.

A land utilization map was made by reconnaissance methods of a cross sectional strip approximately across the central portion of the Valley. Since the natural and cultural regions are longitudinal in shape and are virtually parallel to the directional trend of the Valley, to map a cross section one would obtain a fair sample of all the natural and cultural regions of the area.

The map shows four main and general uses of the land: for crops, for forest, for pasture, and for town and village sites. In general the lowlands and bottoms are used for corn and the higher, better-drained lands for cotton. The slopes of the lower hills and the fine sandy loam soils of the Upper Coosa Valley are used for agriculture, while the mountains, high ridges, narrow strips along streams, and the heavier soils and poorly drained areas are devoted to forest. The lands most generally used for pasture are the hills, slopes of ridges, stony rough land, land on which the soil has been greatly impoverished, and lands that are too low and too poorly drained for crops.

There are striking variations in land utilization in different parts of the Valley. In the broader valleys like those of Choccolocco and Talladega nearly all the land is cleared and in crops. In other rugged hill sections like that of the Coosa Plateau the fields appear as mere patches in the forest and are very irregular in shape.

ORIENTING THE T. C. I. TRAINING PROGRAM

—A. S. Hotchkiss, Tennessee Coal, Iron and Railroad Company, Birmingham.

Introduction sets up the purpose, relationship of thoughts and things and raises the issues.

Orientation is in keeping with the winnowed educational experience of humanity. Six contemporary forms of training in industry,—supervisory, apprentice, job, instructor, cooperative and college graduate are now being developed by the T. C. I. Company.

SOME USES OF PERCHLORIC ACID IN INDUSTRIAL METALLURGICAL ANALYSES

—V. A. Scalce, Stockham Pipe Fittings Co., Birmingham.

One of the outstanding relatively recent contributions to Chemical Analyses in the Ferrous field is the development of Perchloric Acid as an analytical Reagent by Professor Willard of the University of Michigan and Professor G. Frederick Smith of the University of Illinois.

Perchloric Acid is especially suitable for the routine determinations of Silicon and Chromium in Stainless Steels. The Perchlorate method for these elements effect a considerable saving in time over the older methods.

The author, utilizing the "ambidextrous" properties of Perchloric Acid combines the Perchlorate method for Chromium with the Persulfate-arsenite method for manganese and evolves a rapid and fairly accurate method for the determination of Manganese in Stainless Steels.

The sample is dissolved in 72% Perchloric Acid and the method for chromium is followed until the Chromium is fully oxidized. From this point the procedure for manganese in plain steel is followed.

Results obtained are accurate enough for routine analyses. The chief disadvantage is the difficulty in reading the exact endpoint but this may be overcome after long practice.

SOME FUNDAMENTALS IN WILDLIFE CONSERVATION

—I. T. Quinn, Alabama Department of Conservation, Montgomery.

Fundamentals in Wildlife Conservation.	$\left\{ \begin{array}{l} 1. \text{ Soil-water} \\ 2. \text{ Soil Fertility} \\ \text{Erosion} \\ 3. \text{ Fire—Effect} \\ \text{on} \\ 4. \text{ Pollution} \end{array} \right.$	a. population depends on carrying capacity—food
		b. care of brood stock
		a. water
		b. wind
		a. soil
		b. water
		a. Industrial
		b. Municipal
		c. soil

Wildlife population, like human population, depends upon the carrying capacity of the soil—the amount of food produced. If adequate food is provided and broodstock given adequate protection from those elements which adversely affect a given species, normal supply may be maintained.

The carrying capacity on a given range (soil fertility) is dependent upon ability of the area to produce adequate food—the same thing applies to carrying capacity of water.

The fertility of the range, and therefore its productivity, depends upon whether the top soil which contains the principal plant food is eroded by the two principal agencies, viz: water and wind.

The pollution of bodies of water by industrial wastes, municipal sewage and soil, destroys aquatic vegetation, free oxygen, etc., and makes biological deserts of otherwise fruitful waters.

ALABAMA JUNIOR ACADEMY OF SCIENCE

Officers for 1938-1939

<i>President</i> , Wade Moss, Troy High School.....	Troy, Ala.
<i>Vice-President</i> , Jane Frazier, West End High School ..	Birmingham, Ala.
<i>Secretary</i> , Elizabeth Bush, Seale High School	Seale, Ala.
<i>Treasurer</i> , Robert McNutt, Shades Cahaba High School.....	Birmingham, Ala.
<i>Acting-Permanent Counselor</i> ,* J. L. Kassner	University, Ala.

High Schools and Official Delegates at the Sixth Annual Meeting, State Teachers College, Troy, Alabama April 8 and 9, 1938

Bishop Toolen High School—Geraldine Woodcock.....	Mobile, Ala.
Butler County High School—Elvin Luckey.....	Greenville, Ala.
Coffee County High School—.....	Enterprise, Ala.
Convent of Mercy Academy—Marguerite Hyde.....	Mobile, Ala.
Ensley High School—Doris Lawson.....	Birmingham, Ala.
Montgomery County High School—Vincent Bell	Ramer, Ala.
Mortimer Jordan High School—Alton Little.....	Morris, Ala.
Murphy High School—Andrew Douglas.....	Mobile, Ala.
Phillips High School—George Postell.....	Birmingham, Ala.
Seale High School—Vera Parkman.....	Seale, Ala.
Shades Cahaba High School—William Pittman	Birmingham, Ala.
Troy High School—Avan Jackson	Troy, Ala.
Tuscaloosa County High School—Fred Clayton	Northport, Ala.
Tuscaloosa Senior High School—Herndon Dowling.....	Tuscaloosa, Ala.
West End High School—Susie Pradat.....	Birmingham, Ala.
Woodlawn High School—Joe Jones	Birmingham, Ala.

*For his report see p. 10.

Senior Academy Certificate Awards

For the best paper—Robert McNutt, <i>Elementary Principles of Flight</i> Shades Cahaba High School.....	Birmingham, Ala.
For the best exhibit in biology Convent of Mercy Academy.....	Mobile, Ala.
For the best exhibit in chemistry Phillips High School.....	Birmingham, Ala.
For the best exhibit in physics West End High School.....	Birmingham, Ala.

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**Corrections or additions to this roll will be appreciated. Editor.

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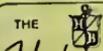
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